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THE FATE OF REPRESENTATIVE GOVERNMENT *

THE future of representative government is without doubt the most pressing question which engages the attention of modern political thinkers. The steady flow of monographs, articles and books on this question is not a tranquil stream of abstract, disinterested, even idle speculation. There is a note of panic about these treatises. They speak of defects, remedies, fundamental revisions of previous modes of representative government in a way which leaves no doubt of the author's conviction that this form of government is facing a crisis.

To put the situation more bluntly, the student of politics sees a serious threat to representative government on the political horizon. He may gloat over the fact, cower before it, throw up his hands in surrender or search desperately for some means of escaping the danger. But he does not question the fact of the threat to the very existence of representative government. Whatever the sympathies of the individual philosopher of

* *Editors' Note:* This article will appear as a chapter of the forthcoming volume *Essays in Thomism* to be published soon by The Thomistic Institute.

politics, the first step in a rational encounter of such a threat is to discover the precise nature of it.

To accomplish that purpose it will be necessary to glance at the threats possible to a representative government, and of all possible threats, to concentrate on those that fall properly within the field of the political philosopher.

Representative government is subject to threats both from without and from within, and under two headings we may sum them up—

Extrinsic Threats:

The first and most obvious extrinsic threat to any government is that of military force. It is always possible that a hostile army may overwhelm a government, invading its territory and subjecting its people without reference to law or justice. Such a threat has been almost a constant factor in history. As such it has never been entirely overlooked by any capable government and has been provided against as far as the particular historical circumstances have allowed. Indeed the guarantee of peace from external enemies enters intimately into the very purpose for which the government exists.

The second extrinsic threat is of an entirely different character. It is indeed extrinsic relative to government, though it is intimately intrinsic to the community which that government directs to the community's end. This threat comes about through a gradual change, either slow or considerably accelerated, in what has been called the " pre-political dispositions " of the community. In other words, in the course of time a fundamental change is effected by such factors as education (good or bad), moral invigoration or degeneration, abundance or scarcity of physical necessities, social harmony or discord, cultural refinement or coarsening. As a result, what was formerly a people capable of self-government degenerates, or a people on the bare margin of civilization matures.[1]

[1] St. Augustine, I *de Libero Arbitrio*, c. 6. St. Thomas, *Summa Theologica*, I-II, q. 97, a. 1, corpus. This distinction of peoples is sometimes phrased differently and given much wider significance when peoples are spoken of as " naturally free " and

Since the particular form of government does not drop down ready made from heaven, but is rather the fruit of the industry of men, it must respond to the conditions of the people whom it governs.[2] Normally the pre-political conditions of a people are slightly in advance (to good or evil) of the course of a government; since it is these dispositions that are met by government. Granted a sufficient change in these dispositions under unchanging government, ultimately a new form of government, responding to those dispositions, must come into existence. A particular form of government threatened by such a change, to better or worse, can thwart the danger if, in time, it recognizes the factors that are making for such a change and limits or eliminates them. However such a progressive change cannot long be hindered except through tyranny.

Intrinsic Threats:

From within, representative government may be threatened by an *absolute* defect, i. e., one that is inherent in the very nature of such a form of government. Such a threat is inescapable: it will be found, if it exists at all, in representative government whatever the age, the nation, the political dispositions of the people governed by it. On the other hand, the threat may be only *relative*, i. e., a defect not inherent in representative government as such but consequent on the circumstances of this particular representative government, of this age, of these pre-political dispositions, of this particular country.

" naturally slave." " Naturally " in such usage cannot refer to anything intrinsic to the nature of some men which gives others the right to exploit them; nature does not condone, much less command, injustice, and each man's personal end is supreme. Nor on these same intrinsic grounds is there justification for the domination of one people over another for the direction, and hence for the benefit, of the subject people. There is nothing in the very nature of an individual or of a people rendering them incapable of self-direction to personal or social ends; in fact the contrary is true. To say that a people is naturally incapable of such self-direction is to use " naturally " not in the sense of intrinsic natural principles (natural law), but in the sense of "*jus gentium*," i. e., this is rather a statement of contingent facts and their consequences. There are, and always have been, such incapable peoples, not by reason of nature but by the operation of such factors as have been mentioned in the text as contributing to the degeneration of men and of societies.

[2] *Summa Theol.*, I-II, q. 95, a. 4; *De Regimine Principum*, I, lectio 1; *ibidem*, lect. 2; II, lect. 9; IV, lect. 8; *Summa Theol.*, I-II, q. 97, a. 1.

The Field of the Political Philosopher

Obviously there is no point in the philosopher's consideration of the extrinsic military threat. That is a question of fact to be examined and faced by political leaders, military strategists, patriots precisely as patriots. The fact of a change in pre-political dispositions—the other extrinsic threat—is also a question to be determined, not by the philosopher but by agencies capable of and equipped for such observation. However the ascertainment of such facts furnishes the starting point for the analysis of the political philosopher by which he can determine the nature, seriousness and possible remedy of such a threat; from this angle a consideration of pre-political dispositions is definitely philosophical.

If the external threats give the philosopher little material for his considerations beyond a starting point, the intrinsic threats to government fall squarely within his field. He not only may legitimately and fruitfully consider this material, he must give it his most earnest thought if he is not to lose title to his high name of philosopher. If such an intrinsic weakness exists in representative government, it is only by recognizing and diagnosing it that representative government can be saved; in such a case the philosopher's considerations will be by way of remedy. They may, however, in truth's severe kindness, be by way, not of remedy, but of cauterization; for if no remedy be possible, if the particular weakness be of such a nature as to be demonstrably irremediable, it must be honestly faced and the hopeless experiment of representative government be abandoned.

The Intrinsic Threat by *A Posteriori* Investigation

It would be unfair both to the critics of representative government and to the representative governments themselves to lump all criticisms together and on that score attempt to estimate men's opinions of this form of government. It will be much fairer to make clear the precise meaning of the term " representative government," thereby eliminating much of the

criticism that is not in fact directed against this form of government, whatever the terminology used in the criticisms.

This necessity of more precise terms will be evident if we remember that the very word "democracy"—which is one of the constants in all criticism of representative government—is an equivocal term. It has been used to describe an individualistic extreme that is in reality a denial of government; in this sense it has been quite properly claimed by such a wide variety of groups as anarchists, syndicalists, material liberalists and communists. At the opposite limit, democracy was used to signify an organismal extreme that submerged both the state and the individual in a monstrosity that went by such names as the "general will." In this sense democracy was used by Rousseau and his disciples of the French Revolution. More recently the same term is applied to what might be called a legalistic popular sovereignty which in itself remained indifferent to whether the head of the state was an elected official or an hereditary monarch; but which insisted on the sacred rights of the individual, a régime of law and order to the common good and an active participation by citizens in government.[3] The confusion of these three accounts for much of the muddled political thinking, both for and against representative government, some trace of which is to be found in so many political treatises today; while, as a matter of fact, the bond of union between the three is little more than the thin thread of a single word.

To avoid such confusion in this study we have used the term "representative government" rather than "democracy" to signify a ruling power that includes popular sovereignty, the sanctity of the individual, and the common good. Its signification might be put more briefly by insisting that it includes popular sovereignty, an explicit or implicit social contract, and dependence on and a harmony with natural law. This form of government is of peculiar interest, not by way of contrast between good and bad governments, nor as a study of one gov-

[3] Christopher Dawson, *Beyond Politics* (New York: Sheed and Ward, 1939), p. 38 ff.; Walter Lippman, *The Good Society* (New York: Little Brown and Co., 1937), p. 241 ff., p. 268 ff.

ernmental device, nor yet by way of comparison with totalitarian forms of government, but rather by way of analysis of one form of good government. There is no particular point in bringing up the distinction between representative monarchy and democracy in the legalistic sense with an elected presiding officer; for the fundamental issue at stake is the individual and the feasibility of his perfection by a participation in government.[4]

Representative government, taken in this sense and seen from this point of view has been, of late, subjected to fundamental criticism by its enemies and has been the object of some serious doubts on the part of its friends. Both the criticism and the doubts turn upon the very nature of representative government and make necessary a clear, reasoned answer to the question: is representative government, by its very nature, doomed to oblivion?

I. *Inimical Criticism:*

The inimical criticism of representative government has been summed up briefly by saying that such a form of government is unscientific, ethically unsound and practically impossible—a criticism that is fundamental and sweeping enough, in all conscience.[5] As a matter of fact the accusation on grounds of

[4] In all good government there is some participation by the citizens, at least what might be called the passive participation involved in the consent of the governed. This is the fundamental participation at the root of the right to revolt against tyranny. But over and above this passive participation, there is, in some forms of good government, an active participation by which the citizen exercises some power in the choice of the officials of government. It is of this latter participation that we speak here.

[5] Such summaries can be found in innumerable modern works on political theory, e. g., George D. H. Cole, *A Guide to Modern Politics* (New York: A. A. Knopf, 1934); Francis W. Coker, *Recent Political Thought* (New York: D. Appleton-Century Co., 1934) especially Chapter XI.

One constant criticism which is not mentioned in our discussion is that of government by average men. This criticism takes two forms: (1) a disparagement of the actual results of democracy and a recitation of its mistakes and defects; (2) a distrust of, and contempt for, the human individual. In its first form the criticism simmers down to a question of fact. In its second form, such criticism certainly needs to be answered; but the issue it raises is much deeper and wider

science—based as it is on such unstable grounds as racial superiority, intelligence tests and the superior influence of heredity—can hardly be taken seriously by any thinking man. It is in itself most unscientific. That representative government is ethically unsound is a criticism that stems from the ninteenth-century ethical theory of a mechanistic natural right which was the parent of the *laissez-faire* program as well as of the " general will " myth of the French revolutionists both of which did much to delete any serious consideration of the individual who is the fundamental possessor of natural rights. This latter criticism is a typical product of the confusion of the senses of democracy. That it is practically impossible is a question of fact that is indeed open to serious discussion; if it be impossible in this sense, only sentimentality would attempt its defense.

A much clearer insight into the real criticism of representative government on the part of its enemies can be had by looking at the details of that criticism rather than at summaries of those details. Thus this form of government has been attacked as: [6]

1. Guilty of fundamental weakness in face of external enemies.
2. Of being ineffective when confronted with fundamental problems.
3. Of lacking authority and of fostering disorder.
4. Of constant injustice both towards its citizens and the common good.
5. Of being undemocratic and capitalistic.
6. Of being bureaucratic, having very little of popular sovereignty in it through lack of participation in government on the part of its citizens.

than any political issue. In this form such criticism demands a defense of human nature itself; it is only indirectly an attack on representative government, as it is, in exactly the same way, an attack on all government. Directly it calls into question the humanity of man. For these reasons we have considered it outside the scope of this paper.

[6] Alfredo Rocco, *The Political Doctrine of Fascism* (New York: International Conciliation Bulletin, no. 223, 1926); Adolf Hitler, *Mein Kampf* (New York: Reynal and Hitchcock, 1939).

It is not our purpose, for the moment, to evaluate this criticism; we shall attempt that later in this study. Here it is sufficient to see the criticism itself clearly, in order that later on we may be able to determine its exact nature and the seriousness of the faults it points out in representative government.

II. *Friendly Criticism*:

The friends of representative government have suffered some serious doubts about it these past few years, doubts whose expression come perilously close to the blunt criticism of its enemies. They claim to have noticed: [7]

1. That it has only a tardy adaptability, particularly when sharp, decisive, immediate change seems essential to continuation in existence.
2. That there is a serious degree of inefficiency in its details of actual government.
3. That it has an appearance of futility and helplessness when faced with fundamental problems.
4. That there is an alarming disinterest and lack of participation in government on the part of the citizens.

A comparison of this criticism with the unfriendly criticisms of representative government, along with the evaluation of both will be reserved for later pages of this study, principally because for such an evaluation it is essential to have clearly in mind the principles inherent in representative government.

A Priori Investigation of the Threat

Representative government, like all governments, has (1) a basis upon which it rests, (2) a form which differentiates it from all other types of government, (3) the matter which this form specifies, and (4) an operation proper to itself. An intrinsic threat to representative government then must be found in some one of these four: basis, form, matter, operation. To

[7] Dawson, *loc. cit.*, pp. 8, 12; Coker, *loc. cit.*, p. 304. Cf. A. G. Hays, *Democracy Works* (New York: Random House, 1939) and Cole, *loc. cit.*

put the possibilities in plain language we may say that an intrinsic threat to representative government can only come from:

1. The ethical principles which are the basis or foundation upon which it rests.
2. Its political principles—whether ultimate or derived—which constitute the form of the government.[8]
3. A conflict or lack of harmony between the political principles or form and the pre-political dispositions of the citizens or the matter; or, in other words through a disintegration of the unity of form and matter.
4. Or, finally, from the execution and application of the political principles, i. e. from the very operation of the government.

The last of these sources of a threat to representative government does not directly involve a philosophical question, but is rather a matter for judicial or police processes. The first is a strictly philosophical question; but since it revolves around necessary and absolutely universal principles, its solution represents no insuperable difficulty and runs nothing like the risk of error to be encountered in dealing with political principles. These latter, which represent the second possible intrinsic threat and with which we shall deal more fully later, are indeed philosophical but they are of the strictly contingent order, intimately involved with the historical circumstances in which they operate. The third possible source of an intrinsic threat—pre-political dispositions of the citizens—is to a great extent a

[8] This distinction of ethical and political principles will be treated at length later in this article (vid. pp. 192-93). It will be sufficient for the present to note that the term "ethical principle" is reserved for principles that are directly of natural law, i. e., not only first principles but also secondary principles derived from the first *by way of conclusion*. By the term "political principles" only those principles are referred to which are, not conclusions, but *determinations* of ethical principles by human authority; whether these political principles be ultimate or derived, they are always arrived at *by way of determination*. The first political principle, as will be seen later, is always in the field of practical politics, a factual instrument establishing the other institutions of government.

question of fact relative to the actual dispositions among this or that people; but the consequences and causes of the fact are within the territory of the philosopher. It is something to be settled and may, indeed be crucial. It represents the most fertile field of modern political discussion.[9] The value of an investigation in this field lies primarily in the detection of the factors making for the change or deterioration of the pre-political principles which laid the original ground for the foundation of a representative government.

An investigation of the intrinsic threat to representative government from an *a priori* point of view will therefore involve:

A. An examination of the ethical principles which are the foundation of the political principles of representative government.

B. An examination of its political principles.

C. An examination of the sources of conflict between the pre-political dispositions of the citizens and the political principles.

D. An indication of the possible sources of danger, insofar as such an indication lies within the realm of philosophy, in the defective execution and application of the political principles or in the very operation of the state.

A. ETHICAL PRINCIPLES OF REPRESENTATIVE GOVERNMENT

To avoid all confusion in the course of this discussion of principles it may be well to point out the double sense in which

[9] As a matter of fact the interest in this field goes far beyond mere discussion. The attempt to mold, immediately and directly, the pre-political dispositions of a people is a fundamental policy of totalitarian régimes. Cf. Hans Barth, "Reality and Ideology of the Totalitarian State," *Review of Politics*, Vol. I, # 3 (July 1939). On the other hand, opponents of totalitarianism frankly admit that the crisis centers in these dispositions, e. g., Ross J. S. Hoffman, *The Will to Freedom* (New York: Sheed and Ward, 1935).

the term can be taken whether it be considered from the point of view of *signification* or of *stability*:

a) In its signification, a principle may be taken either for a root, ultimate origin or basis; or it can signify a fundamental proposition of a science.

b) In regard to its stability a principle can be absolutely immutable and universal, independent of whatever contingent circumstances may arise in the course of the ages; or it can be only relatively stable, possessed of a degree of immutability which makes its change so gradual, even so reluctant a thing as to make its stability stand out as a predominant characteristic.

As will be more apparent in the course of this study, both ethical and political principles are ultimate origins, bases: the first of ethical life, the second of political life as distinct from, but by no means independent of, ethical life. It is in this root sense that we are primarily taking the term "principle." But it is also true that both ethical and political principles are fundamental propositions of a science: the first of the science of ethics, the second of the science of politics.

From the aspect of stability, ethical principles—as flowing from the very essences of things—are absolutely immutable and universal; political principles, inextricably involved in the unfolding of the records of history and containing in themselves an element of human industry, cannot be more than relatively stable.

I. *Ethical principles of all government*:

The ethical principles which are fundamental to politics will be those that flow from the nature and end of man. They are as universal and immutable as their sources; or, to trace their immutability to its last source, they are as immutable as the intellect of God upon which they depend.[10] Ultimately they are reducible to the principles that are regulatory of the life of man

[10] *Summa Theol.*, I-II, q. 94, aa. 2, 4, 5; *ibid.*, q. 71, a. 6 corpus et objectiones.

in his common life with other men, that is, to the principles of justice whose immediate effects are some measure of order and peace. In detail they can be radically stated in two propositions and the consequences of these propositions:

1. *Political society is a natural human phenomenon*:

a) As *natural*, it has common bonds with all else in nature. Certainly, as natural, it does not exist in splendid isolation; nothing in nature does. It does not, in other words, exist *in* itself; there is something immediately beneath and something immediately above it, for, like every other natural thing, it has its orderly place in nature's hierarchy. To both the higher and lower, political society inevitably has relations: to the lower the relation is one of superiority and dominion; to the higher it is one of inferiority and subordination. Political society, as natural, has an origin and a terminus, i. e., it does not exist *for* itself or *by* itself. Rather, in common with all natural things, it exists for something else and by and from something else. It is judged by the same norms that determine hierarchical place in the rest of nature: nature intends that which endures proportionately to the perfection of its being. Nor are these norms the arbitrary rules of a parlor game excogitated by a theorist impatient of observation; they are to be gathered from the objective workings of nature. To "liberate" political society from any of these limitations of natural things is to attempt the impossible. The result of such an attempt is either the irrational insistence that political society is a freak in nature or the monstrous divinization or annihilation of political society. Whatever be the aberrations of the human mind relative to political society, it remains a natural phenomenon and only as such can it be objectively judged.

b) As *human*, political society stands apart, differentiated from every other natural thing. Whatever it has of human characteristics find their source in that which alone in nature is essentially human—the human individual. Consequently

political society does not conflict with or destroy but rather flows from, harmonizes with the essentials of human nature, namely:

1) The end of man: [11]
   a. Of man as a moral being i. e. his individual perfection through the development of the virtues and the perpetuation of the race. These might be called the spiritual and physical ends of the individual if such terminology did not involve the danger of overlooking the fact that both these ends are *moral* ends, being the proper ends of a moral being, the human individual.
   b. Of man as a political being, i. e., his communal end, the common good of the community.
2) The intrinsic and natural guidance of man to his ends or the natural moral law.[12] That this is a corollary of the preceding is obvious. A political society ceases to be human when it cuts itself off from the source of all that is human by operating against the human individual; and it cannot pretend to be operating in favor of that individual when it conflicts with the law provided by nature to perfect the individual, to lead him to his end.
3) The characteristics which flow from his proper and spiritual accidents of intellect and will:
   a. Freedom [13] i. e. not the absence of all restraint but at the very least a moral freedom that allows a man to attain his individual ends; surely that freedom which precludes slavery in the sense of one man being used for another's end rather than being directed and helped to his own.
   b. Equality: [14] for man as a person, a sacred whole with

[11] *De Reg. Princ.*, I, lect. 1.

[12] *Summa Theol.*, I-II, q. 71, a. 6; q. 95, a. 2; II-II, q. 104, a. 1 ad 2um.

[13] *Ibid.*, a. 5; *De Reg. Princ.*, I, lect. 1 et 2; *Summa Theol.*, I-II, q. 90, q. 95, q. 96.

[14] *Ibid.*, II-II, q. 104, a. 5.

supreme ends proper to himself, is not the subordinate tool of anything else in nature. On the basis of his rational nature alone he is the equal of his fellow men and the superior of all else; in those things that pertain essentially and directly to his ends he needs no state aid—in generation, the ruling of his home, the practise of virtue.

c. Inequality: [15] the specific equality of men, the inviolable character of their rights to fulfill the obligations imposed by the very supremacy of their ends, does not demand an absolute standardization of all individuals. It is an absurd denial of facts to pretend that all men have the same intellectual perspicacity, strength of will, inclination to virtue, practical capacities such as ability to govern, to paint, to compose music and so on.

d. Sufficiency: [16] relative to the essentials of life. Men can exist without the help of their fellow men; indeed, through all of history individuals have so existed.

e. Insufficiency: [17]—yet men need their fellow men, for their lives are lived not merely on a plane of bare existence but rather of human existence; they have not merely the end of physical existence to the point that will insure the propagation of the race, they have a more personal end of intellectual and moral perfection that can be seriously interfered with, even thwarted through the absorption of all their powers in a desperate effort barely to hang on to life.

2. *It is the human being that is both beneath and above the state, both its inferior and its superior, both its material and its goal.*[18] This paradox is rooted in the complex nature

[15] *Ibid.*, I, q. 96, a. 4.

[16] *Ibid.*, II-II, q. 104, a. 5; III *Super Libros Sententiarum*, dist. 44, q. 1, a. 3; *De Reg. Princ.*, III, lect. 9.

[17] *Ibid.*, I, lect. 1.

[18] *Ibid.*, III, lect. 11. *Summa Theol.*, I-II, q. 90, a. 3 ad 3um; II-II, q. 104, a. 5.

of the human individual, a nature that is both material and spiritual. As the grasp on the spiritual nature of man is gradually lost, the capacity to understand the nature of political society is proportionately lessened until it disappears altogether with the disappearance of the insight into the spirituality of man. For to understand political society it is essential to see its ethical basis clearly—an impossible task unless man be seen as a complex creature possessed:

1) Of both matter and spirit, body and soul; enjoying only a mortal existence yet living on in immortality.
2) Of apparently conflicting properties. While he is self-sufficient in one sense, in another he is insufficient to himself; while in one sense all men are equal, in another sense no two men are equal.
3) Of a double end, physical and spiritual (though both are moral) as an individual, communal as a political being. In other words, man exists for the perpetuation of the species, for the common good of the community, but he also, and primarily, exists for the perfection of his individual form or human soul.

3. *Consequences of these two propositions*:
   1) Political society, as a natural human phenomenon, takes its rise from nature, not any nature but human nature. So that that *from which* the state proceeds (its origin) will be some elements of human nature itself: [19]
      a. The elements that might be called *naturally* human, as not being subject to the workings of human choice and industry, namely: (1) man's natural inclinations to political life as means necessary to the attainment of his ultimate and individual goal; (2) man's natural insufficiency which must be supplied for; (3) man's natural inequality for which order, protection and fostering is demanded. These three viewed in

[19] *De Reg. Princ.*, I, lect. 1.

relation to man's naturally determined end are the root of *de facto* necessity of the state.

b. The elements that might be called *freely* human, as involving the industry and choice of the individual, namely: freedom, equality, sufficiency, are the root of the form, the extension and the limitation of the state.

2) The end of the state—that *for which* it exists must also revolve around the human individual, since the end must respond to the beginning, the final cause to the efficient cause.[20]

a. Its immediate and proximate end will be summed up in the word " peace," a goal attained by protection from external enemies and by the guarantee of internal harmony through provision of necessities and just distribution of burdens, punishments and rewards.[21]

b. But it will go far beyond this to its ultimate end which is " the life of virtue," " the divine life " by which the state is immediately and directly a means to the end of the individual. This final end of the state means no more than the affording of the opportunity to its citizens to live the life of virtue, to fulfill their natural inclinations to individual perfection. This ultimate end of the state is the *common good.*[22]

3) The *measure* of the state, the determinant of its nature, extent and limit, is also to be found in the very essentials of the one essentially human thing in the universe—the human individual. Thus the inequality and insufficiency of man are a statement of the extent of the state, his equality and sufficiency a statement of its limitation. In other words the measure of the state is the end of

[20] *Ibid.*, lect. 1 et 2.
[21] *Ibid.*, II, lect. 2 et 15; I, lect. 15.
[22] *Ibid.*, I, lect. 14 et 15; III, lect. 3.

man and his needs in relation to the attainment of his end.[23]

4) The *means* of the state, that by which it attains its proximate and ultimate ends are again determined by the nature of the human individual. Because he is a moral being, moving to his end by intellect and will rather than by instinct, the means of the state must be moral means i. e. authority by which the state moves man by his intellect and will.[24]

a. His insufficiency, his inequality, his capacity of choice of a variety of means to his end are in themselves a demand for the existence of authority.

b. His freedom, equality and sufficiency are a statement of the limitation of that authority.

c. The characteristics of the authority of the state then are no more than declarations of the harmony of that authority with individual human nature:

1. Civil authority is thus primarily directive, moving its subjects not by physical but by moral force, by intellect and will. It orders man to his end; the only order in harmony with his nature is a moral order.

2. Secondarily it is coercive by way of protection of common good against the wicked who choose to act against their own end and against the common good of others.

3. It is distinctly limited by several factors: [25]

a) By the natural moral law which is its source.

b) By the form of the particular civil society.

c) By the ends of the state which alone give it power relative to the means to be used.

d. The act of authority—i. e., moral movement by civil

[23] Cf. footnote 17, *supra.*

[24] *Summa Theol.*, II-II, q. 104, a. 1; *De Reg. Princ.*, I, lect. 1.

[25] Cf. footnote 11, *supra. De Reg. Princ.*, IV, lect. 16; III, lect. 11; I, lect. 3.

power—is known as law or the ordering of practical reason to the common good by him who has authority, duly promulgated.[26]

II. *The ethical principles of representative government* are exactly the principles that have just been outlined; the ethical principles of representative government are no whit different from the ethical principles of any other form of good government. These principles stem immediately from human nature itself and consequently are of an absolute universality. The differentiation of governments is not to be sought in their ethical principles; all governments, i. e., all good governments, are *natural human phenomena*. If, as a matter of fact, there is a differentiation on the grounds of ethical principles, then one of the governments is not good but bad government. And bad government is no government: it is a tyranny that is not working for the human individual but against him; it has abandoned the end of the state and consequently its title to existence; it has ceased to be human for it has cut itself off from the sole source of humanness in the universe, the human individual.[27]

The differentiation of governments cannot be ethical but only political. The ethical form gives the common note of all governments, i. e., the human note; the political form gives the differentiation of different types of government, that is, the political note.

B. POLITICAL PRINCIPLES OF REPRESENTATIVE GOVERNMENT

I. *Distinction from ethical principles*:

The ethical principles are absolute and immutable, flowing as they do from the intrinsic nature of things as they are; moreover they are universal principles. By them the inner life of man can be judged immediately by the mere application of the principles, for the inner moral life of man, its goodness or evil,

[26] *Summa Theol.*, II-II, q. 50, a. 1 ad 3um; I-II, q. 90, a. 4.
[27] Cf. footnote 11, *supra*; *Summa Theol.*, I-II, q. 94, a. 1 ad 4um.

does not vary. But the political life of man is quite another thing. In dealing with that we are not dealing with an unchanging set of factors but with the infinite variety of historical circumstance. It will always be true that the end of the state is peace and the life of virtue; but the mode in which that peace and life of virtue is to be attained will obviously be different in the small city states of ancient Greece and the far-flung industrial Empire of modern Britain.[28]

St. Thomas put the difference between ethical and political principles succinctly in insisting on the mutability of the conditions under which man lives, the necessity for a determination of the universal ethical principles to meet the contingent circumstances of life and the relative stability of these determinations.[29]

1) Thomas spoke again and again of the immutability and the mutability of human nature. The first embraced the intrinsic principles of that nature and all that flowed immediately (by way of conclusion) from those principles. The latter extended to the external conditions under which a man lived his life: the social, economic, intellectual, moral and cultural circumstances that obviously vary from age to age, country to country, people to people. In these varying circumstances, the political machinery by which peace and the life of virtue are guaranteed to men has historically varied, indeed must inevitably vary.

2) The universal principles of ethics are brought down to

[28] *De Reg. Princ.*, I, lect. 2; II, lect. 9; IV, lect. 8. *Summa Theol.*, I-II, q. 97, a. 1. This variability of political principles has been consistently recognized by statesmen themselves, e. g., Alexander Hamilton: "The science of politics, however, like most other sciences, has received great improvement. The efficacy of various principles is now well understood, which were either not known at all, or imperfectly known to the ancients." *The Federalist* (Washington, D. C.: National Home Library, 1937), Number 9, p. 48. Cf. Mortimer J. Adler. "Parties and the Common Good," *Review of Politics*, Vol. I, #3 (1939), p. 62 ff.

[29] *Summa Theol.*, I-II, q. 91, a. 3 corpus et ad 3um; q. 95, a. 2 ad 3um; a. 3 corp.; q. 96, a. 1 ad 2um; a. 2 corpus; q. 97, a. 1 corpus et ad 1um.

operation in particular instances in a two-fold way: by way of conclusion and application; and by way of determination or the selection of one out of many means conducive to the attainment of ethical ends. This latter particularization of universal ethical principles is the field of political principles and law.[30] Political principles then are less universal than ethical principles; they are general rather than universal judgments, limited to and fitted for a condition subject to change. Yet they are a determination of ethical principles, existing under and subordinate to ethical principles from which they take their rise.

3) Since political principles direct the external, social life of man, stability is one of their essential characteristics, demanded both because they are to serve as guides and because they bring ethical principles down to the conditions under which men *de facto* are living their lives. A guide that varied from moment to moment or from year to year would, of course, be no guide at all but a source of confusion; on the other hand, the conditions under which men live have a relative permanency about them which would make constantly changing political principles defeat the very ends of politics. If these political principles were fitted to this particular people at this time, then a considerable change in them does violence to the people in question and is no longer a suitable means to ethical ends, no longer a determination of ethical principles and consequently no longer has a claim upon the minds or hearts of men. Yet because the historical circumstances do change, the stability of political principles can never be more than relative.

We have then as the contrasting characteristics of these two kinds of principles: (1) the ethical are universal, primary, absolutely stable, dealing immediately with the inner moral life of man; (2) the political are general, secondary and subordi-

[30] *Ibid.*, q. 95, a. 2.

nate to the ethical which they determine; (3) political principles are relatively stable, contingent upon the historical conditions in which men live.

II. *The nature of political principles:*

From their distinction from ethical principles, political principles may be described, in broad terms, as general judgments about singular circumstances, namely, historical conditions under which men are living, relative to the attainment of the ends of political life. Or, more concretely, it might be said that they make up the stable element in political organization as contrasted with the progressive element furnished by acts of popular sovereignty or representative bodies. As examples of political principles we might mention the Constitution of the United States and its Supreme Court.[31]

Of these two, one, the Constitution, is primary; the second, the Supreme Court, is derivative or secondary. This order is always to be found in political principles. One will be ultimate; all others derived. That is, one will be the first principle determining the political form of the government; from this first determination all the working institutions of the particular political order will flow.

Perhaps this will be clearer if we trace the resemblance between political principles and civil law. The resemblance in regard to the first political principle is especially clear: like law it too is stable, of itself perpetual but not immutable and it too is a determination of the natural law. However, there are some interesting differences flowing inevitably from the relatively universal character of the first political principle. While it is from authority, as all determinations of natural law to common good must be since this end is proper to no individual,

[31] The Constitution and the Supreme Court are excellent examples of ultimate and derived political principles, the Supreme Court deriving from, and established by, the Constitution, which latter is preceded by no political principles. As an example of a concrete distinction between political and ethical principles we might point to the Bill of Rights and the Constitution: the latter is strictly political, the former—though framed as amendments to the Constitution—is for the most part ethical, not established but re-promulgated by a political instrument.

yet it is not from politically constituted authority; rather it establishes this authority. It is from the community as a political group *in via,* in the process of formation. Indeed on this score the first political principle is comparable to the first moral principle, the first principle of natural law which does not presuppose but constitutes morality. Just as the first moral principle comes immediately from nature to whose perfection all morality is directed, so the first political principle comes immediately from the community to whose perfection all politics is directed. As nature is the immediate and ultimate source of morality, so the community is the immediate and ultimate source of all political institutions. This is a truth whose importance can hardly be exaggerated for it brings out clearly the power of the community as the ultimate court of appeal with the right to change what it has established. Another striking difference between the first political principle and civil law is to be seen in the fact that while the first political principle, like civil law, is ordained to the common good or end of the state and therefore deals only with means (political means), it precedes, in the order of nature, the state to which this end is proper. And this is but another declaration that the real possessor of the common good is the community to whom alone the end is essentially proper. It is noteworthy that neither ethical nor political principles establish their own ends; their field is limited to means. In the ultimate analysis they are both acts of the practical virtue of prudence whose ends are furnished by the moral virtues. A political principle attempting to establish an end other than that furnished by the moral virtues under the guidance of ethical principles would be an absurdity—though perhaps a tragic absurdity.

As determinations of natural law, political principles cannot be brushed aside without incongruous results. The result of such a rejection would be either a set of wholly indetermined ethical principles as sole basis of the stability of the political organization—in other words, every man left free to do his own choosing of political means to political ends, which would be political chaos; or the denial of the ethical principles at the root

of the political principles, and this would be like cherishing the roof as we dynamited the foundations. From the nature of political principles and their necessity some important conclusions follow:

1) Every state must have political principles for every state must have determined bases of stability. Or, in scholastic language, every political society must have a political form.

2) In every state there must be a certain lag in adaptation, the result of the forces of stability (political principles) resisting the corroding effects of progressive forces on the form of the political unit.

3) Complete and immediate adaptability, which turns every emergency to the immediate advantage of the state regardless of the injury done to individuals or other nations, can be had only at the cost of the capitulation of the stable elements to the progressive, i. e., at the cost of political principles. This kind of amoral opportunism is catastrophic in its results, for it means government without principles—the destruction of *human* government; it is the destruction of the form of the political organism and consequently the complete loss of direction towards the ends of the state since end responds to form. The result, visible in our times, is ultimately a disregard of the human ends of the state and a succession of rapidly shifting temporary ends and the adoption of means directly inimical to the individual ends of the citizens of the community.

4) On the other hand, complete stability is no less disastrous. It means a constant widening of the gap between the political dispositions of the people (the matter of the political organism) and the political form of their government. It is the death by senescence of the political organism. While the surrender of stability is the tyranny of anarchy, the surrender of progressive elements is the

tyranny of an anachronism, the forerunner and sure guarantee of revolution.

As these stabilizing and progressive factors approach a more perfect balance, the political life of the community is more vigorous and healthy. Their union in the right reason of one agent gives the theoretically better government. But it is to be noticed that both these elements are present in such a government: there is stability, for it is government, not by the whim of one man, but by right reason which has all the solidity of nature itself about it; the progressive elements are perfected here because the determination of the means to be used in these historical circumstances comes about, not through a succession of different agencies whose agreement may be slow and only by way of compromise, but through the much more rapid action of one agency alone.

So in an absolute monarchy it is the right reason of the monarch which is at the same time the principle of stability and progress. If he be wise, prudent, just, the monarch gives excellent government. If he lacks any of these, then he is not governing by right reason and he gives the worst of governments. Even in an absolute monarchy there is usually the one stabilizing element of hereditary succession which transcends the individual monarch. Always, of course, there are the ethical limitations (as distinct from political) of the end of the state and the form of the government, the latter operating automatically in this or that political form. But because the perfect monarch is such a rarity, absolute monarchies are rare and, when present, usually corruptive of human government. It is no doubt in view of this fact that St. Thomas gives the palm of perfection in government, not to an absolute monarchy but rather to an aristocracy in which the element of representation—an active voice in governmental affairs on the part of the people—plays a prominent part.[32]

On the grounds of its political principles there is no intrinsic threat to representative government. It does not abandon

[32] *Summa Theol.*, I-II, q. 95, a. 4.

political principles and thus deny ethical principles or leave them indeterminate, i. e., it does not set up an inhuman government or abandon government to individualistic chaos. It is neither hopelessly conservative through an exaggeration of stability, nor fluctuating with every demand for adaptation through an exaggeration of change or progress. The two are balanced, as they must be for human government. The justice of that balance determines the condition of the particular representative government.[33]

C. POSSIBLE CONFLICT OF POLITICAL PRINCIPLES AND PRE-POLITICAL DISPOSITIONS

The necessity for a consideration of what we have called pre-political dispositions can be traced to the fact that " political institutions and arrangements do not exist in a social vacuum, nor are they prior to the society which they constitute." [34] The question of good government, in any practical sense, must always be a question of good government for this particular people at this historical time. It is fitted, in other words, to their actual condition; if it is not, there is conflict between the political principles of that government and the pre-political dispositions of its citizens.

In speaking of the conditions of a people it is well to remem-

[33] In order to avert the danger of mistaking this conclusion, it must be noted that this whole discussion is on the plane of political philosophy rather than on that of practical politics. It is obvious that a group can seize power, set up a tyrannical government and in their constitution, or first political principle, expressly reject all ethical principles; in such a case, though the government call itself representative, actually it is no government at all, nor is its constitution a political principle (vid. *supra*, pages 195-96). On the other hand, a particular representative government may be unable to meet the threats offered by a change in the pre-political dispositions of its people and so becomes obsolete through what appears to be intrinsic weakness. Actually the forces to which it succumbs are extrinsic to the nature of representative government; and the reason *this* government is here and now weak is not because of an intrinsic defect of representative government as such, but because of the stifling of some of the essential principles by the administrators or citizens of *this* representative government. In other words, what was once representative government has ceased to be good government of any kind.

[34] Adler, *loc. cit.*, p. 52.

ber that these can never be merely material. This has been fairly well recognized in the copious treatments of the political dispositions by modern authors; but it has also been superbly ignored by governmental agencies the world over. It is not enough to consider the economic, social, cultural conditions unless these latter are taken in a very wide sense to include the intellectual and moral state in which this particular people exists.

Thus, for instance, it has been said that in modern times these pre-political dispositions have been democratic because they have been working towards an equality of conditions; [35] in the concrete, wealth has been greater and its distribution much more perfect, there has been more widely diffused education and superior living conditions. As a matter of fact the emphasis here is wrong. An equality of physical and social [36] conditions can be an ideal disposition for totally unrepresentative government, indeed that has not been a totally theoretical result of much modern standardization. The intellectual and moral factors are much more important in the disposition of a people to representative government than are the economic and social.

This can be readily understood if we take the sum of present pre-political dispositions for representative government to be present capacities for social direction. Obviously then the intellectual virtue of prudence, with its moral material, and the moral virtues from which it accepts its principles, must always be of primary importance since it is *par excellence* the directive virtue. On the other hand, intellectual and moral decay, whatever the physical and social conditions, strikes at the very roots of the dispositions for representative government. Again this is not mere theory but something that can be seen as a parallel

[35] *Ibid.*, p. 51. An example of democratic independence of equality of conditions is had in the case of the extremely democratic, though sharply class conscious and class-differentiated, Swiss.

[36] We use the word "social" here in the modern, and extremely limited sense of the word; so, for example, it is used in such expressions as "social security," "social legislation," etc.

to the levelling factors in the physical and social order in the shape of a steady, strong decline in the appreciation of the ethical foundations of political principles. The consequence of this decline is inevitably a loss of the sense of value, not merely of representative, but of all *human* government.[36a] It is encouraging, if startling news that Stanford University inaugurated a course in medieval authors with this reflection: "It is to be hoped that a study of medieval authors such as Thomas Aquinas will make the student a bit more hesitant voluntarily to give up his inalienable rights guaranteed to him by the Constitution. . . ." [37]

A threat inherent in representative government from a conflict of political principles with pre-political dispositions would be through some agency so changing the physical and social, and above all the intellectual and moral, conditions of a people as to demand a change in the form of government because of the impossible gap between the form and the matter of the political organism. Such changes might be brought about, for example: (a) by the reduction of many to poverty through an intense concentration of wealth; (b) by the spread of economic

[36a] "Before all else, it is certain that the radical and ultimate cause of the evils which We deplore in modern society is the denial and rejection of a universal norm of morality as well for individual and social life as for international relations; We mean the disregard, so common nowadays, and the forgetfulness of the natural law itself, which has its foundation in God, Almighty Creator and Father of all, supreme and absolute Lawgiver, all-wise and just Judge of human actions. When God is hated, every basis of morality is undermined; the voice of conscience is stilled or at any rate grows very faint, that voice which teaches even to the illiterate and to uncivilized tribes what is good and what is bad, what lawful, what forbidden, and makes men feel themselves responsible for their actions to a Supreme Judge." Pope Pius XII, Encyclical, *Summi Pontificatus*, October 20, 1939, Official Translation, *A. A. S.*, XXXI (1939), p. 544.

[37] Quoted in *The New York Times* for Sunday, Jan. 8, 1939, p. 10D. It is pertinent here to note that a crucial point has frequently been overlooked in modern political discussion, namely, that representative government really developed on a heritage to which claim had already been surrendered, i. e., the Christian heritage. The fundamental notions of inalienable rights, justice and equality before the law, and so on, stem from the notion of the sacred character of the individual as a person, a notion that is, as Gilson has pointed out, a distinctly Christian notion. As the Christian ethical basis disappears—as it has been disappearing for the past three hundred years—there is a gradual bankruptcy of representative government.

insecurity through decrease in ownership as, for instance, through highly centralized industry in contrast to the small farmer and small operator; (c) by the monopoly of the organs of expression and propaganda by a special interest or group; (d) by the limitation of educational facilities to few or the failure of a widespread educational system to discipline and cultivate the intellects of its pupils thus contributing to the destruction of intellectual and spiritual liberty; (e) by decline or loss of appreciation of ethical foundations of government.

The play of these factors in the change of pre-political dispositions, however, are all factual questions which can be answered, either negatively or positively, only by comprehensive study of the facts. Here it is enough to indicate the sources from which such changes might arise.[38]

D. THREAT FROM EXECUTION AND APPLICATION OF POLITICAL PRINCIPLES

This consideration is, again, a factual not a philosophical question. Its solution must come only after a thorough study of the facts. But here it will not be inopportune to point out some of the possible sources of danger to representative government that may approach along this avenue.

There is first of all the possibility of the growth of a group or voluntary organization to a power superior to that of the state, thus reducing political organization to helplessness in the matter of the application and execution of political prin-

[38] This summary treatment of the agencies of change in the pre-political disposition of a people is not to be taken as an index of their importance. These forces can operate to the extent of making the continuation of this particular government immoral and even physically impossible. Indeed the most crucial political problems of our times are, for the most part, centered in this field of change. The factual side of the question in any particular nation must be, and is being dealt with by historians of the present. Interpretations and remedies are flowing in a steady stream from the pens of political commentators and philosophers. In the next few pages little more than an indication is given of the sources of these changes and the issues at stake. A thorough philosophical study of this phase of the question would be invaluable, particularly in view of the seriousness of the matter.

ciples. Such a group could defy the state with impunity and thus obtain a *de facto* exemption from the law which is the principal instrument of the political organism. For example, a national or international industrial group, financial clique, political party, labor union, may in actual fact be too big for the government. In other words, what is representative government's strength and guarantee of progress (voluntary association) can prove to be a serious weakness.

Again political instruments may be seized by some special interest with the result that the political form becomes a mere tool used not for the common good but for a special end which is inimical to the common good. This will not be a matter of defying political power but rather of absorbing it; it will be somewhat less spectacular than open and successful defiance, but will be no less deadly in its results of destruction of representative government.

There is too the possibility of completely apathy on the part of the citizens of a representative government, thus automatically eliminating the progressive element and condemning the political organism to the slow death that must follow on complete stagnation. Eventually the gap between the matter and form must widen, the political principles become unsuited to these historical circumstances, to be followed almost as a matter of course by revolution.

Finally, and perhaps most insidious as well as most disastrous, there is the possible destruction of the moral force of law through the slow corruption of the moral life of the citizens—a corruption that has historically come about through a variety of causes: lack of discipline, bad education, unbridled passion, corrupt customs.

Examination of the *A Posteriori* Investigation

I. *Comparison of the two criticisms*:

Of the extrinsic or inimical criticisms (mentioned above on pages 180-82), those which are reducible to abuses may be ruled out of our consideration as being not inherent but decidedly

remediable; such are the charges of: being unjust, undemocratic, capitalistic in the bad sense of the term, i. e., abusively capitalistic, of fostering a bureaucracy which absorbs the actual governing of the state. The other extrinsic criticisms are, strangely, reducible to, indeed even identical with, the intrinsic or friendly criticism of representative government, namely: tardy adaptability, inefficiency in broad sense of fomenting disorder and weakness, air of futility in face of fundamental problems, disinterest and lack of participation on the part of the citizens in government. (Cf. page 182.)

These intrinsic criticisms are all fundamental, made as a rule by way of contrast with non-representative governments, particularly totalitarian governments. Thus they call into question the political principles (ultimate or derived) of representative government. Indeed in some of the forms in which they are proposed they challenge political principles in themselves.

II. *Evaluation of intrinsic criticism*:

The first two of these criticisms have already been dealt with in the treatment of political principles (Cf. page 192ff.). A challenge to representative government on these scores (beyond a castigation of abuses) is a challenge to political principles in general, and usually ethical principles; for fundamentally these criticisms are a demand for the total submergence of the elements of stability in a political organization. The latter criticisms demand more detailed examination:

1) On the score of futility in the face of fundamental problems, it must be noted that these problems may be of two kinds:
   a) They may be fundamental problems relative to the matter of the political organism, i. e., of pre-political conditions. If a change is to improvement there is no intrinsic reason why representative government should be futile and helpless. It has means of progress as well as of stability. It may be that a change in the

details of political organization will go far beyond the conceptions formally explicit in the political principles; but these details should not fall short of the original conceptions for any intrinsic cause. It can, of course, be that there is a real helplessness consequent on incapable officials, but this is transient or at least always remediable. On the other hand this change in the matter may be in the direction of degeneration rather than progress; but again this is not a result flowing from the intrinsic nature of representative government but the consequent of a lack of balance between the elements of stability and change or of incapable officials, all of which factors are susceptible of remedy under the political form of representative government.

b) It may be that the fundamental problems to be faced have to do with the form of the political organism rather than with its matter. In such a case the fundamental problem will be either a challenge to the form of representative government in favor of some other form of good government or it will be a challenge to all human government, i. e., a challenge to political forms and principles as such. If Aristotle's contention that the better government is that which governs least be correct, then a challenge of the first sort is definitely the result of a falling back, a degeneration that has its source in defective governing rather than in any intrinsic weakness of representative government. The helplessness in face of such a challenge is a remediable helplessness, not a hopeless one.

A challenge to human government, i. e., a challenge to the political form as such, is ultimately a challenge to the foundations of the first political principle, a questioning of the ethical foundations of all government. Before such a challenge, representative government may indeed be really helpless and futile;

for in representative government there must be an agreement among citizens on the nature of the state, of man and the complex of social institutions. In other words, representative government has only one weapon with which to fight against attack on its ethical principles, i. e., right reason and the proofs it can adduce. It is a serious defect on the part of political principles if they do not protect the ethical principles from such an attack by the working institutions established in the political order. Thus, for example, there is a tragic irrationality in a representative government which, by the working institutions its political principles have established, not only tolerates but positively encourages naturalistic education in its state institutions of learning.

2) The lack of citizen participation in representative government, to be properly evaluated, must be carefully interpreted. To this end it is worthwhile to contrast the citizen participation in government in totalitarian states and in representative governments. To grasp the full significance of that contrast it is necessary to distinguish two kinds of citizen participation in government:

   a) One participation is by way of regimentation. In this case the citizens are as parts of a great machine, cooperating with machine-like precision but with no choice in regard to the method, extent or purpose of the cooperation. The results have an appearance of perfect order, efficiency and smoothly functioning authority. Actually this is a destruction of human order, human efficiency and authority; it is movement, not by intellect and will (by law), but by force.

   b) The other participation is by way of choice. It is a human participation brought about by the exercise of privilege or free obedience to law. It sometimes gives an appearance of disorder, inefficiency and lack of

authority. Actually it is preservation of all of these in the human scale.

It is noteworthy that tyranny on the one side and anarchistic or individualistic democracy on the other are both denials of authority (power to move by intellect and will to the common good) and consequently of human government, since authority is the common means of human government. There is definite confusion in much of the modern identification of absolutism with order and authority, individualistic anarchy with freedom and representation.

On this score—of participation in government—there is no inherent barrier to the citizen's participation in representative government; but there is an inherent opposition to participation by regimentation and an inherent championing of participation by choice, e. g., through voting, voluntary association or as a member of a political body.

3) Lack of interest on the part of its citizens can be fatal to representative government, indeed much more so than to other forms of government, especially to the non-human forms. Not infrequently this lack of interest is the offspring of long security and the absence of fundamental interest; it is not infrequently reawakened by the threat to security or the arising of some fundamental problems.

III. The *a posteriori* investigation of representative government does not disclose an intrinsic threat to this form of government. Rather it singles out, in a confused medley, some of the virtues of representative government and some of the abuses which feed like so many parasites on its blood but which, however damaging they may prove to be, can never be identified with the political organism itself.

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MODERN PHYSICS AND THOMIST PHILOSOPHY

ONE OF THE more disquieting elements in current thought is the widespread belief outside philosophical circles in the natural sciences as the sole reliable source of knowledge, coupled with the fact that the overwhelming bulk of accessible publications on the status and interpretation of natural science is written from a positivist, materialist, or solipsistic point of view.[1]

These writings seem especially persuasive in connexion with modern physics, with which this article will be concerned.[2] Indeed, at first sight there is a remarkable divergence between Thomist views about material nature and the model of it which the physicist builds to reproduce his observations; and a physicist superficially acquainted with Thomist philosophy is not likely to respect the latter when he compares its leading ideas with those of his own science. He cannot find, for instance, in the formulae of mathematical physics, any evidence for the analogical view of being, or the distinction of essence and existence; for his different kinds of atom differ, not in their degree of actual perfection, but merely in dimensions and complexity, and different atoms of the same kind are regarded as identical, and not as diverse manifestations of their common nature. There is no hierarchy of being discernible among the entities of physics; being, as known to physics is univocal, flat, levelled out. Again, the physicist cannot assign any immediate final cause to a physical entity; nor has he room for efficient causality, for in physics neither partner in a change is looked upon as more

[1] Examples are: H. Levy, *The Universe of Science*; Hogben, *Science for the Citizen*; Dingle, *Through Physics to Philosophy*.

[2] The field of study of modern physics may be defined as "non-living material nature," to exclude from it both living material substances and artificial entities such as chairs and statues. In what follows this defining phrase is shortened to "dead matter."

in act than the other. (Unfortunately the word "causality" is often retained and given a special meaning.) He does not talk about substance and accident, but a great deal about functional relations;[3] he finds that when he attempts to locate a substance, physical entities have a disconcerting way of proving inadequate. "Space" as known to physics is a system of coordinates; "time" is no longer the measure of motion, as in the Aristotelean definition, but is itself measured. A glance at a Thomist manual is not likely to be reassuring; it will probably state (very briefly) that physics has to do with a degree of abstraction in which one abstracts from the individual peculiarities of material things, but this is not a good description of modern mathematical physics (and of course was not intended to be). Further, natural science and Thomist manuals have become so insulated that the latter are liable to frame their natural philosophy in terms which suggest a hopeless incompetence about physics and a belief in the adequacy of notions now abandoned by physicists. The concepts of Thomist philosophy and of physics are so distinct as to be difficult of comprehension to those familiar with only one of these disciplines, and yet the vocabularies are similar enough to cause confusion. Finally, the physicist finds that his science is treated with much more deference among some philosophies outside the schools of *philosophia perennis*, who offer less resistance to his tendency to argue that only physics can give any solid knowledge about anything.

We have, therefore, the makings of a considerable scandal; for at present anyone who takes an interest in the more accessible literature on the philosophy of science is liable to acquire a contempt for Thomist philosophy, as well as false notions about the scope of natural science. There is a great need here for sound exposition of Thomist philosophy and its relation to the natural sciences. Happily, the latter are now much better established on the Thomist map than they were a few years ago. M. Maritain in *The Degrees of Knowledge* has strenuously

[3] Cf. Cassirer, *Substance and Function.*

worked out the position of physics in a Thomist hierarchy of sciences; Dr. W. R. Thompson in his *Science and Common Sense* has dealt magisterially with biological sciences; and recently Prof. E. Rideau has written a *Philosophie de la physique moderne*, which includes a compact account of the actual method and structure of modern physics and the consequences of its restriction to the metrical investigation of dead matter. And on the part of philosophy itself, there is less excuse now for taking slick manuals as representative of Thomist philosophy; it has been made clear, both by Maritain's great work and in an important study by Prof. M. Adler,[4] that the question of our knowledge of the essences of material nature is complex and by no means settled in detail. Thus a great deal of ground has been cleared; but there is still much to do in bringing Thomist philosophy into contact with physics and physicists.

In the present article an attempt is made in the *first section* to outline the position of physics with respect to Thomist philosophy and the general reasons for their apparent divergence; this can be done after considering simply some general characteristics of physical investigation and interpretation of experimental data. In the *second section*, certain Thomist doctrines and the divergence of physical science from them are considered more fully. The *third section* outlines certain leading elements in the actual scheme of physics as at present understood, and traces their relation to the views put forward as to the scope and method of physics.

I

In the pursuit of physical and physico-chemical work there may be distinguished two processes, which depend upon and supplement each other. One is the formulation of empirical generalisations on the basis of metrical observation. The other is the construction of a mathematical interpretatory system, such that by deduction from it one can obtain numbers which

[4] In The Thomist, No. 1, p. 80, and following issues.

agree with the experimental measurements as closely as possible. In practice these processes are closely interwoven, but it is permissible to consider an idealised case in order to show that both strands are to be found in the actual structure of physics. Suppose we are investigating the relation between the pressure and the volume of a specimen of air. Both pressure and volume are defined in terms of certain measurable lengths; the experimental investigation could be performed by enclosing the air in a glass tube closed by a column of mercury, altering the length of the latter, and observing the alteration in the position of its surface as the air is compressed. A series of numerical values for one variable, pressure (x), could then be obtained, with the corresponding value for the other variable, volume (y). (Experimental inaccuracies will always prevent the figures from representing exactly the true values of the variables). All other variables, such as temperature, should be kept as constant as possible. Each pair of values of the two variables is found to be related by approximately the same simple relation, namely "x varies inversely as y"; this is shown either by plotting a graph and finding a simple curve which passes near all the points, or by finding a simple equation which is approximately satisfied by all the pairs of values. The experimental data are, then, summarised in the empirical generalisation represented by the equation: $xy = constant$, which is a functional relation, from which the value of x may be deduced when that of y is known. An important point about this empirical generalisation is that it is a *construction*; none of the observed pairs of values need fit it exactly, yet it is regarded as a legitimate generalisation, with a certain likelihood of being true.[5] This is less cavalier than it perhaps appears, because the observed values are themselves liable to be inaccurate. None the less, the fact that we accept such generalisations based on a limited number of inaccurate instances, constitutes a radical divergence from the positivist view, and must later be justified. For the present we accept the position that a correlation of

[5] Cf. Ryle, *Proc. Arist. Soc.*, Vol. XVI (1937), on "inductive reliability."

two variables, each connected with experimentally-observed distances, has been followed by the formulation of an empirical generalisation, in the form of a functional relation. This is the simplest form of the inductive method used in physics.

A vast collection of these functional relations, all founded upon metrical observation, constitutes the raw material for the other process at work in physics: the construction of an interpretatory scheme. By the aid of complicated processes of comparison, analysis, imagination, trial and error, and so on, there are constructed, in thought, models of the experimentally-observed systems, tentative formulations of more fundamental properties, mathematically expressed; and a scheme is evolved such that by mathematical deduction the numerical results obtained by experiment are reproduced as accurately as possible. This scheme includes both quasi-substantive entities (such as ultimate particles, atoms, molecules), and laws (such as that of gravitation), all mathematically defined. The variables which occur in the mathematical expressions include, besides distance which is directly measurable, some derived variables, such as energy and charge, which determine the values of certain distances and are indirectly measurable.

In summary, we may say that the nature and scope of physics depend upon its use of metrical observation, generalisation by functional relations, and interpretation by means of constructions mathematically defined. The consequences for the actual structure of physics will be dealt with later. For the present we wish simply to use the fact that both observation and interpretation in physics are alike concerned solely with the measurable aspects of dead matter, in order to relate physics to a Thomist framework.

It is convenient, however, to mention first the view that "inductive method does not need any philosophical basis; it *works*." The answer to this is that it is possible to use induction without paying attention to its philosophical presuppositions [6]

[6] If I have understood him correctly, one of Whitehead's major contributions to the philosophy of science has been to show that the physicist as such need not wait

since these accord with common sense; yet the validity of the presuppositions must be dealt with philosophically. In particular, induction cannot proceed without a conviction based upon philosophy that there is *order* in the world investigated by physics; and that our minds can come to understand it in some manner if given long enough. Recently the conditions have been worked out for a justification of inductive generalisation (confirmative induction), by means of formal logic working on the empirical data alone, and apart from the metaphysics; [7] but the conclusion is that a necessary condition for such a justification would be some proof, based on formal logic alone, or on some empirical facts, that no subject can have an infinite number of attributes; and such proof is manifestly impossible. In fact, confirmative induction derives its legitimacy from a philosophical view, not based upon physical investigation, that there is order in dead matter.[8] It is false then, to suppose that induction is self-validating.

We must now pass to the Thomist philosophical setting. Thomist philosophy appears very strange to those who, possibly by attention to physical science, have become interested primarily in dead matter rather than living beings. This is partly because, by contrast, this philosophy pays greatest attention to intellectual beings and the matters most vitally important to them; non-rational living organisms occupy a subordinate position, and dead matter is considered as interesting largely because it is capable of being actualised by some higher form. More specifically, Thomist philosophy places God at its apex, and is permeated with His action; it deals with God's creation and conservation of the world; it treats of man as an intellectual being, source of his own acts, tending towards objects of knowledge and love, developing towards God; it treats of other living organisms as analogous to man in respect of life, but distinct in respect of the incomparable gift of intellect by which

for a complete solution of such problems; and to show how physics can work in a self-contained sphere, within which it is independent of philosophy.

[7] Cf. J. M. Keynes, *Treatise on Probability*; Eaton, *General Logic*, Part IV.

[8] It is hoped to develop this thesis more fully later.

man is made capable of elevation to the divine plane (*capax Dei*). Because of this attention to living and intelligent beings, it perceives the scale of perfection among essences, the *analogy of being* in what might be called its "*vertical*" *dimension*; which is overlooked by those who restrict the object of their philosophising to the dead world, under the mistaken belief that where physics has been most successful there will be the best field for philosophy. Further, not being restricted to the measurable, Thomist philosophy points out the "horizontal" analogy of being, which must hold among dead substances as elsewhere, since it is necessary if substances with the same essence are to be distinct.

This analogical view of being or actual perfection,[5] leads to the conclusion that a substance may fulfill the possibilities of its essence to a greater or less degree, and also that the essence itself may fulfil the possibilities of being to a greater or less degree; whence arises the distinction of potency and act. When applied to the process of change, this distinction is the basis of the distinction of four causes in every change; for, given that a substance may be more or less in act, a change consists in a being which is in act in some respect acting on another which is in potence in that respect. Consequently, the change is determined by the efficient cause, i. e. the being originally in act; the matter and form of the other being; and the final cause or term of the change. It is easy to identify these causes in the case of artifacts (though care is necessary not to forget that artifacts are only quasi-substantial, and not to confuse this accidental change with substantial change). Consider, for example, the making of a statue in wood. The material cause is the unshaped wood; the formal cause is the form which shapes the final product. The efficient cause is multiple: the primary efficient cause is God, who gives being to both sculptor and material; the secondary is the sculptor, whose vitality is responsible for the work; the instrumental efficient cause is his chisel. The final cause also is multiple: it divides into ends of the work

[5] On the equivalence of *esse* and *actual perfection*, see Fr. Hilary Carpenter, THE THOMIST, Vol. I, No. 1, p. 53.

(*fines operationis*) and ends of the worker (*fines operantis*), in each of which there is a hierarchy: thus the immediate *finis operationis* is the form which shapes the matter, while the ultimate end of all things is to glorify God: the immediate *finis operantis* is perhaps to earn a living, a further end is to fulfil a human nature, and the ultimate end is to glorify God. And, since potency and act apply to all created beings, in all changes there must be four such elements in the causation (though usually they are much harder to identify).

All these and related Thomist views depend upon the analogical view of being, which is maintained by a refusal to withdraw attention from living substances, or to deal with dead substances only from their measurable aspect.

Thomist philosophy is a synthesis, a balanced account of our certitudes (insofar as they are independent of Revelation); and dead matter, however tractable to physics, is not regarded as the type of being. This constitutes a difference from certain post-Renaissance philosophies which have dropped the attempt to form a commentary covering all the objects of experience, and have concentrated on that minimal aspect which is dealt with by physics. It would be impossible to treat this theme adequately in a short space, and an unsympathetic treatment would be worse than useless; but with suitable reservations, it may be said that Descartes' system, formulated as a mere prologomenon to his physics, explicitly neglects final causes and attempts to reduce all being to the type dealt with in mathematics; and that Kant in the *Analytic* attempts to find an apodictic proof, not based upon ontology, that there must be physical laws, while in the *Dialectic* he condemns metaphysics. In consequence, such modern philosophy as derives from these thinkers is liable to be unduly preoccupied with physics, to its own stultification (because the philosophical basis of induction is neglected), and to the neglect of what is enormously more important. It is also incapable of providing the proper setting for natural science.

We can now deal more specifically with physical science. Physics (in its modern, not its Aristotelean sense; cf. p. 217),

is concerned with non-living material nature, which we agreed (note 1) to refer to as "dead matter." Dead matter is near the bottom of the Thomist scale, the first stages above the unknowable prime matter; it can be given accidental forms by man for use or for the sake of beauty, and it can be informed with life and with a rational soul by God. It is therefore in potency to these forms, which, as intellectual beings, we recognise as higher. But physics deals with matter in isolation from these higher forms, abstracting from all characteristics specific to life or intellect. It is not, however, this restriction to dead matter which leads physics to neglect the analogy of being and the doctrines deducible from it. These doctrines apply equally to dead matter, in which, for example, change is still subject to the four types of cause. The roles of these four types may seem more difficult to define in natural changes of dead matter than in the working of artifacts; but when it is remembered that Thomist philosophy has demonstrated that God exists, and creates and conserves the world, the difficulty subsides. God being pure Act, communicates being to dead matter creating it, therefore He is its efficient cause, and the final cause of all His creation must be God's glory. And the formal and material causes of dead matter are respectively the form, or principle of order, and the *materia* which is informed. To say that, as such, dead matter is ordered, is, of course, to assert something like what vast quantities of post-Cartesian philosophy has laboured unsuccessfully to prove; but this failure would seem to result from reliance on the dead world to produce its own credentials, and moreover from a confusion of two very different questions, namely, "Are changes subject to causation?" and "Must changes occur in ways describable by physical laws?"[10] Whereas the Thomist conviction of an order, an intelligible order, depends upon a philosophy which rises to systematic treatment of intellectual beings and their causality, and in particular demonstrates the existence of God, whose work of creation cannot possibly be without order. When it is realised

[10] Cf. E. Meyerson, *Identity and Reality*, Chap. I.

that the applicability of the full doctrine of causation to dead matter may be deduced from the fact of creation, the difficulties in our knowledge of its application, which compel us to be agnostic on many points,[11] no longer cast doubt on the fact of the application itself. It is evident, then, that a definition of modern physics must take account of some restriction besides the restriction to the study of dead matter. This we shall show to be the restriction to what is *measurable*.

In ordinary Thomist terms, the kingdoms of "physics," mathematics and metaphysics are distinguished according to three degrees of abstraction,[12] according to their freedom from matter. It would be pardonable if the unwary were to gain the impression that Thomism separates physics and mathematics. However, the first degree of abstraction covers not only modern physics but all natural sciences and also philosophy of nature; and the applicability of mathematics to empirical data is not denied. We have seen how the standard method of physics is metrical observation. For this reason, the use of functional relations and mathematical deduction is integral to modern physics. In the phrase of Maritain, modern physics is "formally mathematical and materially physical"; it is an intermediate science of the type conceived by S. Thomas.[13] It is tied to matter because its empirical data are derived from material observation; it is dependent upon mathematics for the formulation and testing of its interpretatory scheme. It is the use of mathematical deduction which alone makes possible any attempt at the unifying of empirical generalisations, and frees physics from being a mere catalogue of experimental data. And it is this mathematical element, integral to modern physics, which gives rise to the apparent divergence of physical concepts from

[11] Cf. Section II.

[12] *Abstractio formalis*, that is—which is an important point, because *abstractio totalis* is the only kind of abstraction familiar to students outside the Thomist schools. Cf. Maritain, *Degrees of Knowledge*, p. 47. Moreover, the objects of all these degrees of abstraction are used in senses unfamiliar to many non-Thomist philosophers.

[13] *Degrees of Knowledge*, pp. 52, 53, 79; cf. 56, 168, etc.; Rideau, *op. cit.*, pp. 12, 13, 24.

Thomist principles; and harmony is restored very simply when it is recognised that the use of mathematics results from the fact that physics examines dead matter only through measurement, and is limited thereby.

II

This description of physics vis-à-vis Thomist philosophy is perhaps best developed with reference to a few selected Thomist doctrines: for instance, causation, the analogy of being, and our knowledge of essences.

It is held on philosophical grounds that the order in dead matter is subjected to four kinds of cause. In the physical scheme, however, these are not mentioned, and are not in fact distinguishable; an interaction between two physical entities is described by combination of certain equations representing the entities and any general laws involved; and this mathematical process does not discriminate between the material cause, the formal cause, the immediate final cause, and the instrumental efficient cause. The mathematical type of *ground-consequent* relation is in fact made to *symbolise* the real cause-effect relations: deducibility to symbolise causality. Since for physical interpretation there is only this one type of relation available, we cannot expect to find the several types of cause dealt with separately, nor to be able to identify them in a change considered physically. Again, with regard to analogy, we cannot expect (since physical entities, such as atoms, have to be represented in algebraical terms) that atoms of the same kind shall be represented as members of a hierarchy of perfections; from the physical point of view they are identical except in the numerical values of certain variables. (Entities of different kinds are represented physically as differing only in the number and arrangement of their constituent parts, or in the case of "ultimate particles" by the magnitude of charge and mass.)

In regard to our knowledge of essences in physics, the position is clear up to a point: physics does not give us adequate definitions of the essences of dead matter. We cannot have a knowl-

edge of the nature or natures of dead matter similar to that which we have of the specific nature of man, nor yet similar to that lesser understanding which we have of the specific nature of an animal or vegetable substance.[14] Certainly we reach our physical scheme by a route similar to that which may lead to adequate knowledge of our essence. A physical entity is accessible through its interactions with others,[15] from which a picture of more fundamental characteristics is built up, and finally (if possible), there is constructed a thing of reason with an objective foundation (*ens rationis cum fundamento in re*). This looks similar to our approach towards adequate knowledge of an essence: by means of observation of contingent accidents (events, interactions), we reach a knowledge of the necessary accidents or properties, and thence of the essence which is their *raison d'être*. For instance, we recognise from man's accidents the properties of the specific nature of man (liberty, morality, sociability, religion, etc.), and hence the specific difference, namely rationality, which determines these properties and from which they may be deduced. In the case of physics, however, every step away from the actual experimental data renders our constructions less immediately intelligible;[16] we can use vague analogies like muscular force and mental energy, but they are misleading, and the variables in terms of which the constructions of the physical scheme are ultimately defined (such as energy, charge, mass) are certainly not intelligible to us in the same degree as rationality in man, or immanent activity in plants. What seems uncertain is whether the *entia rationis* of physics are inadequate definitions of real essences, or definitions (adequate or inadequate) of accidental concretions.[17] The nature of their relation to their *fundamentum in re* is not altogether clear. But in either case it seems clear that physics "cannot provide the natural prolongation of the ontological explications supplied by philosophy."[18] There is no escape from the relative non-intelligibility of dead matter; when we

[14] Cf. Adler, *loc. cit.*, pp. 114, 115.
[15] Cf. Rideau, *op. cit.*, pp. 41, 42.
[16] Cf. Rideau, *op. cit.*, pp. 25, 29.
[17] Cf. Adler, *loc. cit.* (III).
[18] Cf. Maritain, *op. cit.*, p. 81; cf. Chaps. I and III, *passim*, esp. pp. 196-7.

try to penetrate its specific natures by the only possible method open to physics, namely by an organised survey of their properties *via* the quantitative ground of accidents, we find that our interpretations have only the status of *entia rationis*, which are not directly intelligible because they involve variables remote from observation, and whose relation to their real ground (*fundamentum in re*) is not well understood. And with regard to substance (even supposing for simplicity that we held that there was only *one* essence informing dead matter), we should still have the greatest difficulty in deciding which of our physical entities represent dead substances, and which accidental concretions. Individuality in physics is remote from the philosophical conception of substance.[19] Any physical entity is part of a larger physical system from which it is separated only in thought, for all the entities of the universe interact to some degree, and it seems to be a matter of indifference, fundamentally, whether the interaction of two atoms is occurring while they are at a great distance apart or when they are so close as to form a molecule; physically speaking, certain variables will have altered and certain new accidents will have appeared in consequence. But it should be evident from the foregoing that none of this presents any philosophical difficulty.

III

Several other characteristic notes of modern physics may be treated as direct consequences of the use of mathematical *entia rationis*: for instance, its " space," " time," and " determinism."[20]

" Space " as known to us in ordinary experience [21] is replaced by systems of coordinates. " Time " in physics is not the measure of motion as in the Aristotelean definition, and has not the characteristics of *la durée*: only a comparison of motions more and less regular remains, a variable which is itself measured.[22]

[19] Cf. Rideau, *op. cit.*, pp. 40-41.
[20] Cf. Rideau, *op. cit.*, pp. 33-60.
[21] On real space see *Degrees of Knowledge*, pp. 201-202.
[22] On real and physical time see Maritain, *Theonas*, pp. 61-101.

" Determinism " in physics simply denotes the view that dead matter is " mathematically intelligible "; that is, that the order which informs dead matter is symbolisable by mathematical relations and gives rise to experimentally-accessible functional relations; and this also is remote from philosophical determinism.

And several major advances of this century are of interest as being consequences of certain limitations imposed upon observation by the nature of things (and not by mere experimental difficulties). These are the theory of relativity, the " principle of indeterminacy," and Dirac's principle of superposition of states.

The theory of relativity completes the scheme of classical mechanics, which applies with great accuracy to phenomena on the ordinary scale. Because of the finite velocity of light, which nevertheless provides the quickest signal of a physical event, we cannot detect an event at exactly the moment it happens. Moreover, observers with different positions, velocities and accelerations relative to the system in which the event occurs, will observe the event after different lapses of time. The contribution of the relativity theory is to make this clear, and to formulate relations between the times and distances involved, such that the description of the event is independent of the particular frame of reference of each observer. The connection of the " spatial " and " temporal " measurements turn out to be such that certain equations which formerly contained the square of the distance coordinates (x^2, y^2, and z^2) must now contain also $-t^2$, where t is the time coordinate. The use of these equations in four variables is an algebraical device, whose purpose is simply to insure that the description of an event shall be independent of particular conditions of observation. The statement that it represents a new concept, " four-dimensional space-time," although intelligible in physics, has proved a grave danger to sound thinking. Again, it is possible to obtain a four-variable expression analogous to that for the curvature of a three-dimensional solid, and this expression is important because it determines the energy of a particle at a given point in space and instant in time; in physics it may safely be called

the " curvature of space-time," but such terminology is misleading in the extreme when it is used in ordinary speech without translation. The looseness of such language, when used outside the technical vocabulary of physics, is quite extraordinary; it has contributed largely to the unnecessary mystery about relativity, and must surely be partly responsible for the astonishing looseness of thought exhibited by those who have come to believe that space and time are not " really " distinct and that efforts to form a mental or even pictorial image of a world of four dimensions (all on equal footing!) can serve a useful purpose. No philosophical conclusions can in fact be drawn from the success of the relativity theory, except possibly some confirmation of the views on physics given above.

The " principle of indeterminacy " is one of the non-classical principles necessitated by the success of the quantum theory and of the greatest importance in phenomena on the atomic scale. The historical starting-point for a number of new principles was the fact that numerous experiments gave results incompatible with the older view that energy is a continuous variable, but easily interpreted on the view that energy is only transferred in discrete amounts; or more accurately, that we cannot, as in the classical view, regard the disturbance of the any transfer of energy except in these discrete amounts (quanta). From this it results that in order to observe a physical system, which can only be done by an interaction with another system such as a measuring instrument, we must disturb the system to at least a certain irreducible extent. We cannot, as in the classical view, regard the disturbance of the system as (in principle) capable of being reduced indefinitely. This limitation on our observation has important consequences. We cannot, in principle, observe with complete accuracy both the position and the velocity of any particle; this is an obvious consequence of the disturbance due to observation. If we observe the position more accurately, the velocity is correspondingly less accurately observable, and *vice versa*. With regard to physical law in general, this means simply that the data by which physicists formerly believed that they could forecast the

future of a physical system are unattainable; we could not, in principle, forecast the result of an experiment with complete accuracy, because our observations can never tell us exactly the conditions of experiment;[23] we have to express predictions in the form of statistical laws, stating the probability of such and such a result. What possible influence can this have upon the theory of causality? Yet extravagant pseudo-deductions about a " failure of causality " have been made. We can only say that the belief that this " principle of indeterminacy " (a better name would be " principle of inexact observation ") has any metaphysical implications seems to arise merely from a facile attempt to draw philosophical views on causation and order from physical science. And the attempt to deal with human freedom on this basis[24] seems to commit most of the errors possible in the philosophy of science.

Dirac's " *principle of superposition of states* "[25] is an interesting outcome of a special restriction upon observations. A series of discoveries has established very peculiar analogies between " radiation " and " matter." It is established that each of these may affect observing instruments either in ways interpreted as characteristic of corpuscles (which may be defined as manifestations of energy localised in a small volume and capable of local motion with finite velocity), or in ways interpreted as characteristic of waves.[26] According to the type of experiment performed on it, the same physical system appears to manifest itself either as a corpuscle or as a wave, as continuous or discontinuous; and it seemed that two distinct *entia rationis* were needed to symbolise the same *fundamentum*. In view of the status of the interpretatory *entia rationis* there would seem to have been nothing anomalous in this situation from a philosophical point of view. The two conceptions have been related by the wave-mechanics, which interprets the wave-function as defining the probability of finding the energy localised corpuscle-

[23] Cf. Dingle, *Nature* (1935), Vol. 135, p. 677.
[24] Eddington, *Nature of the Physical World*, Chap. XIV.
[25] Dirac, *Wave-mechanics*, Chap. I.
[26] Cf. Rideau, *op. cit.*, pp. 29-32.

fashion at any given point: none the less, the necessity of "superposing" the wave and particle models in order to describe all the phenomena remains as a further example of the restrictions placed upon physics by its method of metrical observation."[27]

Indeed, it may be said generally that the leading principles of modern physics accord admirably with the way in which the empirical data are obtained (namely, by metrical observation). This was not the case when physics still used such concepts as solidity, quantity of matter, absolute motion, and "forces" pictured as similar to muscular effort: it is in fact a happy result of the advances of the last thirty years in physics, and one for which philosophers may legitimately be grateful.

* * *

The conclusions of this article may now be summarised. Modern physics uses experimental methods, which are confined to metrical observation, and accordingly its subject-matter is the measurable aspects of non-living material nature. The inductive method cannot provide its own credentials, and the validity of physical conclusions rests upon a philosophy which can show that order is to be expected in dead nature; in Thomism this may be deduced from the doctrine of creation. Modern physics goes beyond the formulation of laws, and constructs a unified interpretatory scheme, to which the use of mathematics is integral: consequently it uses mathematically defined *entia rationis* (the nature of whose relation to their *fundamentum in re* is not altogether clear). The restriction of physics to the quantitative aspects of dead matter causes it to seem at variance with Thomist philosophy in important respects. Some modern philosophers would seem to have been influenced by the rise of physical science in such a way that they have tended to restrict their philosophy too much to the same subject-matter as physics, with lamentable results. Consequently, it is of importance that competent Thomists should consider in de-

[27] Cf. Maritain, *Degrees of Knowledge*, p. 109. Dingle, *Nature* (1935), Vol. 135, p. 515.

tail the nature of modern physics, the way in which it depends upon philosophy for its validity, the general reason for its apparent conflict with Thomist philosophy, and the way in which harmony is effected, by consideration of the effects on physics of its self-restriction (and the results for Thomism of its own efforts at synthesis). The purpose of this article has been to bring before Thomists the situation, that the study of physics is for many a stumbling-block to Thomist philosophy; the reasons for that situation; and a tentative set of solutions to the various problems. It is to be hoped that those more competent than the author will apply the spirit of the *Summa contra Gentiles*, and exhibit Thomism as the solution of the many current perplexities arising from the widespread attention to physical science and neglect of *philosophia perennis*.

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THE FECUNDITY OF GOODNESS

PROFOUND study in either the historic or speculative order if pursued without the spirit of prayer remains fruitless. In history, it tends to the minutiae of erudition or to quasi-superficial syntheses which have not their source in God, but rather in man, who changes with the times. Likewise in the speculative order, assiduous labor without the spirit of prayer is too often abstract and not sufficiently vitalized. It sometimes tends to investigation of useless subtilities, or is not sufficiently directed to the fruitful understanding of mysteries and to a profound knowledge of the most vital questions of theology, as for example, sanctifying grace, the infused virtues and the gifts of the Holy Ghost. As a consequence, the wide-awake actuality of theology to solve from above and in truth the problems proposed to us today from all sides is not always manifest.

On the other hand, however, prayer or piety without the true study of theology often turns into a sentimentalism in which religious emotion without solid basis prevails and in which there is a pretended love for God; whereas there should be a true and real love for God and souls which grows daily more powerful. "Not he who saith, Lord, Lord, shall enter into the kingdom of heaven; but he that doth the will of my Father who is in heaven, he shall enter into the kingdom of heaven." [1]

A happy combination of a prayerful spirit, therefore, with the profound study of the most fundamental metaphysical principles offers the only true course for the wise man to pursue; though it has become the habit of our practical-minded age to look upon metaphysical principles, so highly honored by the scholastics, as dry formulas which are not infrequently meaningless. As a matter of fact these principles, stated with sharp, classic simplicity, are storehouses crammed with inexhaustible

[1] *Matthew*, vii, 21.

treasures of truth's beauty and profoundity. They are to be penetrated only through the arduous labor of profound thought; but the results more than justify the effort involved. In this article, we shall examine just one of these metaphysical principles, and that briefly by scrutinizing it in some of its applications most pertinent to Catholic life.

I. The Principle

The principle we choose is one cited by St. Thomas in the beginning of his tract on the Incarnation. It is there proposed in the following way: "*Good, by its very nature communicates itself to others*, as is evident from Dionysius (*De div. nom.*, c. 4). Hence it pertains to the very notion of the Highest Good that it communicate itself to creatures in the highest possible manner; and this is accomplished in the highest degree, as St. Augustine says (*De Trin.*, lib. xiii, c. 17), 'when it unites to itself a created nature, so that out of three things, Word, soul and body, there be but one person.' It is therefore manifest that God fittingly became man."[2] We do not sufficiently realize that the fruitfulness of the Eucharistic communion is, as it were, the extension of this other communion by which the very mystery of the Incarnation is brought about. To go further, it is a certain irradiation of the supreme communion of the divine persons which is to be explained by these words of Christ: "That all be one, as thou Father in me, and I in thee."[3]

This principle of the diffusion of good is often proposed thus: *good is essentially diffusive of itself*;[4] primarily of course as an end which attracts other things to itself, and secondarily as an

[2] Pertinet ad rationem boni, ut se aliis communicet, ut patet per Dionysium (iv, cap., de Div. Nom.). Unde ad rationem summi boni pertinet quod summo modo se creaturae communicet, quod quidem maxime fit per hoc *quod naturam creatam sic sibi conjungit ut una persona fiat ex tribus: Verbo, anima et carne*, ut dicit Augustinus (De Trinitate, lib. XIII, c. 17). Unde manifestum est quod conveniens fuit Deum incarnari. *Summa Theol.*, III, q. 1, a. 1.

[3] *John*, xvii, 21.

[4] Bonum est diffusivum sui. *Summa Theol.*, I, q. 5, a. 4, ad 2um; Bonum enim, secundum suam rationem, est diffusivum sui. *Summa Theol.*, I-II, q. 1, a. 4, ad 1um.

efficient cause, inasmuch as everything that acts must act for a definite end. The sun diffuses its light and heat for the good of the universe; an adult plant generates another; an animal generates offspring like itself for the conservation of the species. In a higher order, a man who attains a knowledge of the truth wishes to spread that knowledge among others; and finally, an apostle, enlightened by God and living for love of Him, wishes to communicate this salutary love to souls.

In all branches of life good is essentially diffusive of itself. Not, of course as Cajetan explains,[5] in such wise that the essence of goodness be the *actual* communication of itself, but that the *aptitude* or propensity to communicate itself be contained in the notion of goodness. Now this actual communication is either necessary, as in the sun, or it is free, as in a wise man who dispenses of his wisdom, as in the apostle who arouses the love of God in souls by his preaching, and *a fortiori* in God, Who does not act out of necessity of nature on things outside Himself and Who in no way has need of creatures in order to possess His own infinite goodness with perfect felicity. As the Vatican Council says so clearly: " God in his goodness and omnipotence created all things in perfect freedom, not in order to increase His own beatitude, nor to obtain it, but in order to manifest His own perfection through the goodness He has bestowed upon creatures." [6]

II. The Principle Applied to the Trinity

Penetrating more profoundly, St. Thomas considered the principle of the diffusion of good as an illustration of the mystery of the Trinity. In the famous chapter of the *Summa Contra Gentiles*, book IV, ch. 11, he masterfully proposes the same truth when he says: " A different manner of communication is to be discovered in things according as they differ in nature. *The higher a nature, the more intimate is that which emanates from it.*" [7] In other words, good is essentially diffusive

[5] *Summa Theol.*, III, q. 1, a. 1. [6] *Denz.*, n. 1783.

[7] . . . et quanto aliqua natura est altior, tanto id quod ex ea emanat, magis ei est intimum.

of itself, and in proportion as it belongs to a higher nature, the more abundantly and intimately is it diffusive of itself.

This St. Thomas explains briefly by saying [8] that whereas in the lower order, plants generate other plants distinct from themselves, in the animal kingdom, sensation emanates vitally and intimately from the senses; likewise from the created intellect there proceeds understanding and the accidental word, but more perfectly in the angels than in man; finally, from the intellect of the Father, which is subsistent understanding itself, there emanates in an identical nature the Word, not indeed accidental, but substantial: the living and intelligent Word, God of God, light of light, true God of true God, begotten not made, consubstantial with the Father. From the Father and Son proceeds, again in identical nature, the Holy Ghost, Who is personal love and as it were the nexus between the Father and the Son. For the higher a nature, the more intimate to it is that which proceeds from it.

It is therefore fitting that the Highest Good (*Summum Bonum*) be superlatively diffusive or fruitful of itself within itself (*ad intra*) in a numerical identity of nature. The Highest Good must possess life in all its perfection and immanence; to it therefore belongs the greatest fruitfulness, inasmuch as it diffuses itself wholly, profoundly, communicating not only a kind of participation of its own nature or an imperfect expression of itself, but communicating its whole most simple nature without any division and multiplication.

In this mystery, then, which is the most startling exemplar of the Eucharistic communion notwithstanding its obscurity, there is admirably manifested the harmony of the divine fruitfulness and unity of God. Indeed, from this we see that creation was entirely free and in no way necessary, for even if God had created nothing, a perfect fruitfulness would be still found in Himself. The principle—good is essentially diffusive of itself, and more intimately and abundantly in proportion to its perfection—would still be fully vindicated.

[8] *IV Cont. Gent.*, 11.

Note well that in the operations of the Godhead within itself (*ad intra*) and in the divine processions, there is no *causality*; the divine processions are superior to both final and efficient causality. The divine nature actually preexisting in the Father is not caused in the Son and Holy Ghost, but is communicated to them somewhat as in an isosceles triangle, the first angle does not cause the superficies of the second and third angles, but communicates its own superficies to them while not communicating itself. That the divine nature is an infinite goodness communicated to the Son and the Holy Ghost by the Father through His own fruitfulness, remains forever above the order of causality, both final and efficient.

III. The Principle Applied to the Incarnation

By the same principle another mystery, *the elevation of the human race and of the angels to the order of grace*, is illustrated. It is fitting that God communicate to us not only existence, life, and understanding in the natural order, but also a participation of His nature or of His intimate life, if such be communicable.

Likewise it is illustrated, as we have said, in the mystery of the Incarnation, which is the root of the mystery of the Eucharist. In order after sin to renew our adoption as sons, it was fitting that the only-begotten Son of God communicate, not merely the plenitude of created grace, but His very Person to the humanity of Christ, so that the theandric action of the Savior might have a value wholly infinite, i. e., so that His satisfaction and merit might be for us at the same time adequately sufficient and super-abundant.

IV. The Principle Applied to the Eucharist

In the Eucharist, finally, there is attractively displayed the diffusion of the divine goodness and the intimacy of this diffusion in all those who approach the holy table worthily and who accordingly are singularly united in the love of Christ. In this

way the Eucharist appears to great advantage as the bond of Charity.

Beyond all doubt the diffusion of the sacrifice of the Cross is manifested in the Sacrifice of the Mass. For in this way the sacrifice of Christ is lastingly preserved: " For the Victim is one and the same, the same now offering by the ministry of the priest, Who then offered it on the cross. Only the manner of offering is different." [9] That is to say, now in an unbloody manner, not a bloody one. The sacrifice of the Mass not only intimately emanates or proceeds from the sacrifice of the Cross, but it is *substantially* and numerically the same sacrifice, just as it is numerically the same Victim, and numerically the same principal priest, " always living to make intercession for us." [10] Hence all Masses celebrated daily are in an unbloody and sacramental manner, the quasi-irradiation and diffusion of the sacrifice of the Cross in all regions and times unto the consummation of the world.

But it is especially *in the Eucharistic communion* that the marvelous diffusion of the goodness of Christ towards us is manifested, and it is the wondrous principle of the intimate union of all Christians. The superiority of the sacrament of the Eucharist in comparison with the other sacraments is due to the fact that it contains both grace and the Author of grace and intimately unites us with Him. " The Eucharist," says St. Thomas, " is as it were the consummation of the spiritual life and the goal of all the other sacraments: the sanctifying qualities of all the sacraments are a preparation for the reception or consecration of the Eucharist." [11]

Among the effects of the Most Holy Sacrament, the principal one is that of vivifying union with Christ, which increases in us habitual grace, charity, all the infused virtues and the seven gifts of the Holy Ghost. Thus the Eucharist confers on each of the faithful who receive it worthily that which Christ as He appeared in the world brought into the world—the life of grace.

[9] Concilium Tridentinum, sess. XXII, cap. 2.
[10] *Hebr.*, vii, 25.
[11] *Summa Theol.*, III, q. 73, a. 3.

"This sacrament," says the Angelic Doctor, "effects in man what the Passion of Christ effected in the world." [12]

And moreover, since it is given as food and drink, "this sacrament does for the spiritual life everything that material food and drink do for the corporal life, in a word, it sustains, increases, rebuilds, delights." [13] "My flesh is food indeed and my blood is drink indeed." [14] From this we see that the *goodness of Christ is diffusive of itself*, as symbolically expressed by the legend of the pelican.

St. Cyril of Alexandria says in his commentary on St. Luke, ch. XXII: "The life-giving Word of God in uniting itself to its own flesh, made that flesh vivifying. It was therefore fitting that He be united in some way to our bodies through His own sacred flesh and precious blood, which we receive in vivifying benediction in the bread and wine." The same Cyril comments on the words "immediately there came out blood and water," saying: "Since the sacred mysteries have here their beginning from this source, when you draw near to the awesome chalice, approach as if you were to drink from the very side of Christ." [15]

Christ said: "I am come that they may have life and have it more abundantly," and indeed in the Eucharistic communion, in the intimate union of our soul with the body and soul of Christ, our minds are illuminated by the intelligence of Christ, since they receive an increase of lively faith and of the gifts of intelligence, wisdom, knowledge and counsel; our will is likewise strengthened by the most holy will of Christ, since it receives an increase of charity, hope, justice, religion and the gift of piety; and our sensible nature is purified also by the most pure sensible nature of Christ, receiving an increase of chastity as well as fortitude, patience and the gifts of fear and fortitude.

Hence, as the Council of Florence declares: "The effect of this sacrament in the soul of the worthy communicant is the

[12] . . . effectum quem passio Christi fecit in mundo, hoc sacramentum facit in homine. *Summa Theol.*, III, q. 79, a. 1.

[13] *Summa Theol.*, III, q. 73, a. 3.

[14] *John*, vi, 56.

[15] *Comm. in Joan.*, xix, 34.

union of man to Christ. And because man is incorporated in Christ by grace and united to His members, it follows that grace is increased by this sacrament in those who receive it worthily; and everything which material food and drink effects as regards corporal life, this sacrament brings about in the spiritual life: sustaining, increasing, repairing and pleasing." [16]

The principal effect of the Eucharist is not, therefore, as some have said, the remission of sins,[17] but union with Christ and the increase of grace, charity, the other virtues, and of the seven gifts of the Holy Ghost, which are connected with charity and are proportionally increased along with it.[18]

Communion is the true spiritual food of the soul, and a pledge of future glory, since grace, which is increased by it from day to day, is the seed of glory or eternal life. This is beautifully expressed by St. Thomas in the office of Corpus Christi:

> Farewell to types! henceforth
> We feed on angels' food:
> The slave—O wonder!—eats the flesh
> Of his Incarnate God.

Here again, therefore, is our principle profoundly verified: goodness is essentially diffusive of itself, and more intimately so in proportion as it is perfect. In this way the Heart of the glorious Christ is as it were the living chalice which contains His precious blood, sacramentally shed daily for the quickening of our souls. Christ truly came that we might have life and a more abundant life. For since each communion ought to increase our charity, every communion should be substantially more fervent and more fruitful than the one before; for each by increasing our charity disposes us to receive Christ more fruitfully the following day; and thus it would be, if venial sins of negligence or tepidity did not diminish our good dispositions to receive the Holy Eucharist fruitfully.

* * *

[16] *Decretum pro Armenis* (Denz. n. 698).
[17] Cf. Concilium Tridentinum (Denz. n. 887).
[18] *Summa Theol.*, I-II, q. 68, a. 5; q. 66, a. 2.

From these principles an immediate and self-evident conclusion is that *the Eucharist is for Christians the sign of union and the bond of charity*. This has been well exposed by St. Augustine, whose words on the subject are cited by all theologians: "Our Lord proffers His body and blood in those things which form one out of many parts: bread is a unity made up of many grains of wheat; wine, from many grapes." [19] Therefore the same Augustine says, "O sacrament of piety. O sign of unity. O bond of charity." [20]

Likewise in the Council of Trent: "Finally however, and with paternal love, the holy Synod urges, demands and beseeches through the bowels of the mercy of our God, that each and every one who is called a Christian shall now at length assemble and agree in this sign of unity, in this bond of charity, in this symbol of concord . . . " [21] For unity is the principle of union, and in proportion as we individuals are united to Christ, in that proportion are we all united one to another. Thus through communion fraternal charity is greatly increased, in accordance with the command of Christ, "Love one another as I have loved you." [22]

Among the various conflicts which gravely disturb the peace and provoke war, nations seek the bond of union, and will not find it except above them in the true Christian religion and in particular in the Eucharist, which is simultaneously the food of souls and the light and strength of all the faithful united in the mystical body of Christ.

* * *

St. Augustine and St. Thomas [23] point out the immense difference between material and spiritual goods: material possessions, like houses or fields, cannot be simultaneously owned by many, and hence frequently cause discord and fighting. On the contrary *spiritual goods*, like truth and virtue, *may be*

[19] *In Joannem*, tr. XXVI, n. 17.
[20] *Ibid.*, n. 13.
[21] Sess. XIII, cap. 8 (Denz. n. 882).
[22] *John*, xiii, 34.
[23] *Summa Theol.*, I-II, q. 28, a. 4, ad 2um; III, q. 23, a. 1, ad 3um.

possessed integrally by many simultaneously. Nay more, each man possesses a greater degree of truth and virtue, in proportion as he communicates them to other men. By passing on truth we do not lose it, but rather penetrate it more deeply. The same holds true for charity; indeed, if a man wishes to exclude any one from his charity, he thereby loses it. Among all spiritual goods, charity is essentially and preeminently diffusive of itself, particularly the charity of Christ present in the Eucharist as food for souls.

Truly the Eucharist is the bond of charity, inasmuch as in it is best verified the principle that spiritual goods can be integrally possessed by many persons at one and the same time. These are never the principle of division, but rather of intimate union. Thus are fulfilled the words of Christ: " That all may be one as thou, Father, in me, and I in thee "; i. e., just as the Father and Son are one by unity of nature and love, so all the faithful are one by union of grace and by conformity of will and love.

Thus also in the Eucharist we find a perfect verification of the principle enunciated above: *good is essentially diffusive of itself, and more intimately and abundantly in proportion as it is perfect*. In the Eucharist the charity of Christ, increasing the charity of all the faithful who receive it worthily, is a fullness diffusive of itself, and more fully and intimately so in proportion as we approach it the more fervently.

St. Thomas therefore concludes: " The Eucharist is ordained to the ultimate effect of the passion of Christ, having as it were its fullest efficacy from it, and so of itself alone it prevails over all spiritual defects, . . . and it is in a sense that which consummates the effect of each of the other sacraments." [24]

The Angelic Doctor also says: " Spiritual food is not converted into him who eats it, but it converts such a one to itself. Thus the proper effect of this sacrament is the conversion of man into Christ, so that he may say with Paul: ' I live, now not I, but Christ liveth in me (Gal. ii) .' " [25] " The sacrament of the

[24] *IV Sent.*, d. II, q. 1, a. 2, ad 1um. [25] *Ibid.*, XII, q. 2, a. 1, q. 1, c.

Eucharist has therefore for its principle effect the union of man with Christ" [26]—transformation into Him—and thus brings about a profound and supernatural harmony among the faithful, a harmony which should be on earth the beginning of the heavenly concord of all the elect who are united in God, clearly seen and perfectly loved, and who in God see whatever is to be thought, desired and done. Would that many would draw nigh to the fount of true charity. O that among the faithful of all classes and nations, the Eucharistic communion may effect that intimate union of faith, hope and love, whose consummation will be in eternal glory, in fulfillment of the words of Christ: "That they may be one, as you Father in me, and I in you, that they may be one in us, that the world may believe that you sent me." [27]

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[26] *Ibid.*, a. 2, q. 1, 3 c.
[27] *John*, xvii, 21.

PROBLEMS FOR THOMISTS

I. THE PROBLEM OF SPECIES.

(Fifth Installment)

VI. THE CONSEQUENCES OF A TENTATIVE RESOLUTION OF THE PROBLEM

24. The problem with which we began will be *finally* solved whenever there is conclusive and unqualified evidence showing the truth of one theory and the falsity of the other,—the theories being so related as contraries within the framework of accepted principles that a choice between them is necessitated. In our present situation, the state of the evidence permits only a *tentative* resolution, and justifies our making it in terms of the theory that natural species are ordered in an ontological hierarchy, differing from logical hierarchy by the absence of common, proximate genera; that there are only five natural species, or some similarly definite, small number (certainly less than ten, and perhaps as few as four or three); and that all other sub-specific "kinds" are accidental classes (races, varieties, "systematic species," etc.). There is no need here to summarize this theory, to cite traditional texts in its support, or to argue for its truth. That has already been amply done.[185] What remains to be done is to examine the consequences of accepting this theory *as if it were true.* This can be accomplished in three steps.

We must first attempt to reconcile as much of the rejected theory as possible with the position here adopted. We have already noted that the two theories agree on some points; but even where they disagree, it may be possible to save positive insights by translating them into terms harmonious with the truth of the first position. This calls for a re-interpretation of the second position for the sake of assimilating whatever truth it contains.

Secondly, we shall consider the bearings of this resolution on tangential matters in epistemology and logic, for the problem of species belongs to them as well as to ontology.

In the third place, and finally, we shall discuss a number of

[185] For the exposition of the theory by reference to authoritative texts, vd. Part IV, Section 15, *supra*; for a concise summary of it, its agreements and disagreements with the contrary theory, vd. Part IV, Section 17, *supra*; for the arguments *pro* and *con*, see Part V, Sections 19 and esp. 20, *supra*.

problems in the philosophy of nature,—hierarchy and continuity, contingency, evolution,—which are affected by a decision on the question of species.

25. *Reconciliation by Translation.* Three critical words have occurred in the exposition and defense of both positions: "species," "genus" and "sub-species." They enable us to construct a scheme of translation, whereby to re-interpret either theory according to the truth of the other.[186] Now, according to the truth of the first position, we can say the following: (1) that whatever the second position calls a "species," subordinate to such forms as *plant* or *animal,* is a sub-species, i. e., an accidental class, a concretion of substance and accident, a combination of substantial and accidental determinations; [187] (2) that what the second position calls a "genus" may be an infima species, such as *plant* and *brute animal,* or it may be a sub-species, such as *fish* and *mammal,* or it may be a logical genus, such as *animal* is with respect to *man* and *brute*; [188] (3) from the foregoing, it follows that whatever the second position calls a "sub-species" or "systematic species" is similarly regarded by the first, but it must be added that many kinds which the second position calls "species" and "genera" are also regarded as sub-species; (4) *man* is a specific nature, but *man* is an infima species of the genus *animal* only in a logical hierarchy of terms; speaking ontologically, one would have to say that *man* is a species of *brute,* in the sense that "brute animality" names the generic constituent in human nature; [189] (5) what the second position

[186] Vd. the table of translations in the summary of the two positions, Part IV, Section 17, *supra.*

[187] This statement cannot be made adequate until two things are decided: whether there are two species of inanimate substance, or only one; whether there are several species between *plant* and *man,* or only one. But, in any case, the principle of translation is clear, if it be understood that whatever is treated by the second position as species sharing equally in a proximate, common genus, must be regarded by the first as sub-species, for only these can participate in a common, proximate nature, i. e., a specific nature.

[188] Nothing that the second position calls a "genus" can be so regarded *ontologically,* because by the principle of ontological hierarchy, there is no common, proximate genus for any two species; whereas according to the second position a "genus" is always capable of being participated in equally by two or more species.

[189] Vd. fn. 153a, *supra.* "Brute" cannot be predicated of *man,* as a logical genus, such as "animal." The statement, "*man* is a species of *brute,*" construed ontologically, can be understood in only one way, namely, that "brute" names the species proximately inferior to *man,* and hence indicates the generic constituent in human nature. There is a further error to be avoided: the generic nature of *man,* which "brute" can be used to name, is not the same as the specific nature

sometimes calls a difference, such as "irrational" or "insensitive," is not a difference diverse from *rational* or *sensitive*, but simply the same difference signified as a privation of form in an inferior species.[190]

Now, in one sense, such a scheme of translation does not reconcile the two theories, if reconciliation consists in showing how apparent opposites are both true *in their own terms*. What we have done is quite the opposite, for it amounts to saying that if the first theory be true, the second, understood in its own terms, is, for the most part, false. But, in another sense, there is reconciliation here, namely, the assimilation by a true position of analytical points made by a false one, an assimilation accomplished by regarding the same words which both use as strictly equivocal in the two usages.[191] This does not mean that the false theory equivocates throughout, for in its own terms it can speak as univocally as the true one. It means rather that, restricting ourselves to the analytical terminology of the true theory, we can nevertheless benefit by translations of the sort indicated. We can re-read the rejected theory in a way that makes it contribute to the truth.

which "brute" also names, for the sensitive nature is present in man *eminently* because elevated by the difference of rationality, whereas it exists *simply* in brutes. Cf. Aristotle, *Metaphysics*, X, 8, where he says that the animality of a man and of a horse is not the same animality, for difference in a genus results in an otherness which makes the genus itself other (1058a3-8). Cf. fn. 139b, 143, 143a, *supra*.

[190] In other words, the same difference can be diversely *signified*, but two differences, each positively signified, *are* diverse. Species do not differ from one another by the diversity of their differences from a common genus, *except logically*; ontologically, there is only one difference between two proximate species, and that one difference can either be positively signified as in the higher (*rational*) or privatively signified with respect to the lower (*irrational*).

[191] It must be insisted that the usages are *equivocal* and not *analogical*. If one person uses the word "species" to name what another calls a "sub-species," because it is an accidental class, and if the latter uses the word "species" to name what the former calls a "genus," and if "genus" for one is never common to two species, whereas it always is for the other, then obviously there is equivocation between them in the use of these words, for they have transgressed essential distinctions. In contrast, the use of the word "species" to name a sub-genus in logical classification, or the use of the word "genus" to name a species which subsumes other species, is not equivocation, for in logical procedure we recognize that, with the exception of summa genera and infima species, every term can be a genus in one respect and a species in another. So, also, the same word "sub-species" can be used unequivocally for what Gredt calls a "systematic species" and a "race," these differing only in degree of relative instability; or for all the kinds which scientists call "races," "species," "genera," "families," "orders," "phyla," etc., since these are all sub-species in the same sense, i.e., accidental classes. But to call a "sub-species" (an accidental class) a "species" (an essential nature) is equivocation of the same order as calling an individual a "species."

Thus, for example, the first position faces a number of questions about the order of sub-species *inter se*: whether there is any sort of " hierarchy " among them; in what sense they may be arranged continuously in progressions from lower to higher; and whether such orderings are unilinear or multilinear.[192] Now if what the second position calls " species " and " genera " are sub-species, for the most part, then its analysis can be so translated as to contribute to the solution of these problems. There is a hierarchy among sub-species, but it is the sort of hierarchy which is proper to accidents: sub-specific kinds are arranged as species in common genera, and these in turn are species in higher genera, also common, and so on from the lowest to the highest classes. By " lowest " and " highest " here is meant either the least and most inclusive classes, speaking extensionally, or the classes having the most and the fewest accidental determinations, speaking in terms of comprehension. That the hierarchy of sub-species should be the same kind of hierarchy as that which obtains among accidents is proper, since sub-species are all accidental classes, and it is only by their accidental determinations that they can be arranged. Furthermore, the hierarchy of accidents or accidental classes of substance (sub-species) has the same structure as a logical hierarchy. Therefore, the second position is right in its conception of hierarchy insofar as it is dealing with sub-species; [193] and the first position must distinguish between two sorts of hierarchy: the strictly ontological hierarchy of species, and what we shall call the " logical hierarchy " of sub-species. Making this distinction enables the first position to assimilate, not only the relevant parts of the rejected analysis, but also the systematic classifications constructed by natural scientists, for all of these envisage a logical hierarchy of classes. By combining these two insights, we shall be able to solve the problem of the relation of hierarchy, in both senses, to continuity, and to see the extent to which there is progression from lower to higher types within the domain of a single species.[194] Here by " lower " and " higher " is meant less and more perfect accidental embodiments of the same specific nature. In other words, sub-species can be arranged as lower and higher classes (less and more general in a logical sense) and also as lower and higher types (less and more perfect in an ontological

[192] Vd. end of Part IV, Section 15, *supra.*

[193] It is wrong, of course, when it applies this conception to species as if there were no difference between logical and ontological hierarchy. Whenever it attempts to combine both notions, as in the case of *man,* it necessarily equivocates. Vd. Obj. 6 *contra* II, in Part V, Section 19, *supra.*

[194] This will be done in Section 27, *infra.*

sense). Species, however, can be arranged as lower and higher only in an ontological sense, i. e., as grades of being. It is not in their logical arrangement, but in their ontological disposition, that sub-species occur in *continuous* progressions from less to more perfect types. Such progressions are the accidental image of the ontological hierarchy of substantial forms.

The translation suggested also helps to resolve matters which the second position could not determine by itself. Thus, in its own terms, it had difficulties with the distinction between natural and systematic species, on the one hand, and between systematic species and races, on the other.[195] But these distinctions can be clearly made once it is recognized that systematic species are always sub-species, and that the only natural species are those which are perfectly ordered in an ontological hierarchy. Whatever kinds truly participate in a common nature that is equally proximate to both, and from which both differ by diverse positive determinations, cannot be natural species, and must be systematic species. The distinction between natural and systematic species is strictly ontological, because the one is constituted by the essential unity of a substantial form, whereas the other is an accidental unity, a union of specific nature and accidental determinations. In contrast, the distinction between "systematic species" and "races" falls entirely within the sphere of accidental classes. Both are systematic categories, logically distinguished as more or less general: *systematic* species subsume *systematic* races and are, in turn, subsumed by *systematic* genera, families, phyla, etc. Beyond that, of course, there may be a genetic distinction between *systematic* races and species in terms of interfertility, sterility of offspring, and other criteria. We shall return to this matter later.[196] Here suffice it to point out that the biological scientist regards the distinction between *systematic* races and species as relative rather than absolute: *races gradually become species*.[197] But sub-species, of whatever systematic rank, never become natural species. In short, the distinction between sub-species and species is an essential one ontologically, whereas the distinction between the various systematic ranks of sub-species is not. The former distinction can be made by the philosopher alone; the latter belongs to the work of the scientist.

Most important of all, however, is the effect of this scheme of

[195] The writings of Gredt, Brennan, and Phillips exemplify these difficulties. Vd. fn. 161 and 163, *supra*.

[196] Vd. Section 27, *infra*.

[197] Vd. T. Dobzhansky, *Genetics and the Origin of Species*, New York, 1937: Ch. I, III, X.

translation upon the contradictions or inconsistencies in the writings of Aristotle and St. Thomas. That there are such inconsistencies is clear from the texts which can be found to support contrary theories. Upon the judgment, furthermore, that the first of these theories is true, a large number of passages in Aristotle and St. Thomas must be regarded as false statements, if their words are read in the sense which these same words have according to the true theory. But the inconsistencies become only *apparent*, and the false statements become true, if we can interpret these same passages by translating the critical words into their equivalents. This means, of course, that Aristotle and St. Thomas used such words as " genus " and " species " equivocally, and without ever noting the equivocation explicitly, but verbal equivocation is better than inconsistency and falsehood.

The words " species " and " genus " occur in three different sorts of contexts in the writings of Aristotle: (1) in strictly ontological analysis,—passages in the *Metaphysics* and the *De Anima*; (2) in logical treatises, such as the *Categories, Posterior Analytics,* and *Topics*; and (3) in works which are, for the most part, not philosophical at all, but empirical science, such as the *Historia Animalium*, though it must be added that Aristotle did not recognize this distinction as we understand it today.[198] In general it is the case that in a work like the *Historia Animalium*, Aristotle uses " species " and " genus " to name sub-species of various systematic ranks,—anything from races to families and phyla. In other words, Aristotle is writing here as a scientist would today, making systematic classifications, and hence constructing a purely logical hierarchy.[199] These passages, therefore, are not inconsistent with the

[198] Cf. W. Jaeger, *Aristotle*, Oxford, 1934: Ch. XIII.

[199] The following passage in the *Politics* is of interest in this connection. " I have said that there are many forms of government, and have explained to what causes the variety is due. . . . If we were going to speak of the different species of animals, we should first of all determine the organs which are indispensable to every animal, as for example some organs of sense and the instruments of receiving and digesting food, such as the mouth and the stomach, besides the organs of locomotion. Assuming now that there are only so many kinds of organs, but that there may be differences in them—I mean different kinds of mouths, and stomachs, and perceptive and locomotive organs—the possible combinations of these differences will necessarily furnish many varieties of animals. . . . And when all the combinations are exhausted, there will be as many sorts of animals as there are combinations of the necessary organs " (IV, 4, $1290^{b}21$-36). Clearly, the varieties thus discriminated are not natural, but systematic, species, i.e., races or subspecies, accidental classes. Such classes can, of course, be arranged in a logical hierarchy, because a logical hierarchy, which subsumes specific terms under common genera, is the proper order for accidents. And Aristotle rightly draws a com-

truth about the ontological ordering of natural species. That truth is enunciated in the *Metaphysics* (VIII, 3) and the *De Anima* (II, 3, 4), though it must be admitted that there are other passages in the same chapters of the *De Anima* in which Aristotle talks about a diversity of species sharing in the generic sensitive nature.[200] There are two possibilities of interpretation here: either there are several infima species ordered hierarchically between *plant* and *man*, in which case *brute* is a genus only in a logical and not an ontological sense; or if the argument concerning three souls is taken to mean that there are only three living species, then the " diversity of species " mentioned is a diversity of sub-species. The choice between these alternatives depends, of course, upon the ultimate resolution of a difficult point in the true theory (vd. Reply Obj. 2 *contra* I), but one thing is clear: the alternatives are incompatible, and the inconsistent passages must therefore be interpreted as equivocating on the principal words.

Finally, there are discussions of definition in which Aristotle considers genus and species as terms in a logical hierarchy (*Post. Anal.*, II, 10, 13; *Topics*, VI, 6). Here, of course, several species participate in a common, proximate genus; a given term may be generic in one respect and specific in another; there is no indication of what terms are infima specific, although it is said that there must be infima species; species are distinguished by the diversity of the differences they add to their common genus. If it be remembered that a logical hierarchy is an order of universal terms according to their generality, whereas an ontological hierarchy is an order of grades of being and hence its members are all (infima) specific natures, then the plurality of species and genera mentioned in logical contexts will not be misinterpreted. Wherever Aristotle exemplifies his logical discussions of definition and division by using the names of animals, he is talking about what, from an ontological

parison between such an accidental classification of animals and his classification of states, for the political forms he is discussing are only accidentally, and not essentially, different. Vd. my discussion of the kinds of states in *The Demonstration of Democracy*, Proceedings of the American Catholic Philosophical Association, XV.

[200] The same inconsistencies occur in *Metaphysics*, X, 8. Here Aristotle tries to say that species are always contraries within the *same* genus, and at the same time also to say that the genus of two species is *never the same*, because difference in a genus makes the genus itself other. If Aristotle had distinguished between the ontological meaning of " genus " and " species," in which signification species are not contrary nor do they divide a common genus, and the logical meaning of these words, in which signification a common genus can be univocally predicated of species related as subsumed contraries, the apparent inconsistencies in these and similar passages could have been avoided. Cf. fn. 189, *supra*.

point of view, are only systematic classes, or sub-species of the sensitive nature which constitutes *brute* as a natural species. The one exception, of course, is the case of *man* which is spoken of as a species of *animal,* along with *horse* or *ox.* Here the word " animal " must be read either as signifying a logical genus, common to the sensitive and the rational natures; or it must be read as equivalent to *brute* as an infima species, in which case *horse* and *ox* are not, ontologically, species but sub-species; but then we cannot speak of *man* as a species of *brute* in the same sense that we can say *horse* is a (sub) species of *brute.* Since the context is logical, it is permissible to forget that *man* is truly a natural species, whereas *horse* and *ox* are not, and to treat all three terms as on the same level logically with respect to the genus *animal.* It is not permissible, however, to forget that such treatment is proper only in a logical discusssion, for then all the errors resulting from the confusion of logic and ontology will occur. Transgressions of this sort are the cause of internal difficulties in the second position: the duplicity of the Tree of Porphyry, the treatment of *irrational* as a difference diverse from *rational*, the equivocations relating to *man* (vd. Obj. 6 *contra* II), etc.

The *Summa Theologica* and the *Summa Contra Gentiles*, by their very nature, include a wide variety of subject-matters. As theological works and as *Summas*, they necessarily treat of whatever, in any field of natural knowledge, is relevant to their problems. We must, therefore, depend upon the context to determine whether a given passage is to be read as philosophical or scientific, as logic or ontology. In general, the same rules of interpretation apply to St. Thomas as to Aristotle. They can be summarized briefly as follows. (1) Wherever St. Thomas is considering species as grades of being, the word " species " always means natural species, and species thus considered do not participate in proximate, common genera. (2) If with respect to such species, a common genus is mentioned,—as *animal* common to *brute* and *man,*—the word " genus " must be understood logically and not ontologically.[201]

[201] St. Thomas insists upon this distinction. " We must not consider the diversity of natural things as proceeding from the various logical notions or intentions, which flow from our manner of understanding, because reason can apprehend one and the same thing in various ways. Therefore since, as we have said, the intellectual soul contains virtually what belongs to the sensitive soul and something more, reason can consider separately what belongs to the power of the sensitive soul, as somethin_g imperfect and material. And because it observes that this is something common to man and to other animals, it forms thence the notion of the *genus* " (*Summa Theologica,* I, 76, 3, ad 4). Therefore when he says that " although man is of the same *genus* as other animals, he is of a different *species*; specific difference

(3) Wherever St. Thomas refers to "species" of plants or to "species" of animal, such as *lion* or *horse*, the word "species" must be understood to mean sub-species, for here he is employing the knowledge derived from Aristotle's scientific works; the same rule applies, of course, to mention of "species" of elements and mixtures.[202] (4) In some passages, St. Thomas refers both to the five forms and to inferior kinds included under each; sometimes he says "in each of these genera, there are various degrees" (*S. T.*, I, 76, 3); sometimes he speaks of the five as species, and yet adds that "in each of these one species is more perfect than others" (*S. T.*, I, 47, 2); and sometimes he talks of each of the five natures in the plural, speaking of "the lowest forms" or "the forms of mixed bodies," etc. (*S. C. G.*, II, 68). In all of these cases, and there is a vast multitude of them, the presence of ambiguity cannot be ignored. The rule of interpretation must be stated complexly: *either* the five forms are infima specific natures, and then inferior kinds, called "species," are merely sub-specific, accidental classes, and furthermore the plural mode of speech means that the multiplicity of elemental forms is an individual or accidental multiplicity, not a plurality of species; *or* if there are species subordinate to the five, then the five kinds,—or four, since *man* is excepted,—must be understood as logical genera. In short, that which is regarded as a genus subsuming a diversity of equally participating species, cannot be regarded as a nature ontologically, for it is neither a substantial form, nor the generic constituent in a substantial form. According to the truth of the first position, the second of the two interpretations must be rejected, except for the possibility that there are several infima species intermediate between *plant* and *man*; in any case, *plant, mixture* and *element* do not subsume a diversity of substantial forms. Stated positively, the rule is simply that, in ontological discourse, species cannot be spoken of as including a diversity of species, unless the word in the first instance

is derived from the difference of form; nor does every difference of form necessarily imply a diversity of *genus*" (*ibid.*, 75, 3, ad 1), St. Thomas must be interpreted as writing logically and not ontologically. Vd. also *Summa Contra Gentiles*, II, 95.

[202] The *De Caelo* and the *De Generatione et Corruptione*, unlike the *Historia Animalium*, are much more complex combinations of philosophy and science. The analysis of the types of change therein is strictly philosophical; but the discussion of the variety of elements and mixtures cannot be so regarded. Just as the *Historia Animalium* is, almost in entirety, an ancient anticipation of modern biological science, so far as taxonomy is concerned; so, in part at least, the *De Caelo* and the *De Generatione et Corruptione* are ancient anticipations of modern physics and chemistry. This is especially true of the classification of the elements.

means logical genera, or the word in the second instance means sub-species.[203]

The elimination of ambiguities of this sort helps us to remove the apparent contradictions which occur in the writings of St. Thomas on the question of species.[204] To illustrate this, let us consider two of the most perplexing instances of apparent contradiction, and attempt a clarification.

The first concerns the sensitive nature: whether *brute animal* is an infima species, or brutes, lacking and possessing locomotion, are related as inferior and superior specific natures. The argument about three souls and four modes of life (*S. T.*, I, 78, 1) appears to take the first alternative. Having or lacking the locomotive power merely

[203] A good test of these principles of interpretation is made by trying to apply them to *Summa Theologica*, I, 77, for in the exposition of this question there are many ambiguities and equivocations, resulting from a double use of such words as "genus" and "species." Thus, in A. 3, St. Thomas speaks of species of *animal*, according to a "difference in the sensitive soul, which is sometimes rational and sometimes otherwise. Hence *rational* and *irrational* are differences dividing animal, constituting its various species." Here, obviously, St. Thomas must be using "animal" to name a logical genus, for the sensitive soul which is irrational is certainly not the same nature as the sensitive soul which is rational; strictly speaking, the latter nature should not be spoken of as a sensitive, but as a rational, soul; and *irrational* is not a difference diverse from *rational*, but the same difference diversely signified. Cf. A. 1, ad 7. In his Reply to Obj. 2 in the same article, St. Thomas fails to distinguish between the primary contrariety which belongs only to substantial species, and the secondary, or logical, sort of contrariety which belongs to accidental species; and this leads to unclarity concerning the participation of species in a common genus, which is proper only to accidental contraries. Cf. fn. 199, *supra*. In A. 4, ad 1, the ambiguity is most apparent: "The species of a given genus are to one another as before and after, like numbers and figures, if considered in their nature; although they may be said to be simultaneous, according as they receive the predication of a common genus." Here the word "genus" must be understood in its logical signification in both usages, for it is regarded as predicated commonly of diverse species; but the species are regarded, on the one hand, as ordered in an ontological hierarchy (before and after), and, on the other, as logically arranged (simultaneous). Cf. *ibid.*, 76, 3, ad 4; and I-II, 61, 1, ad 1. In A. 6, St. Thomas distinguishes only between proper and extraneous accidents, saying of the latter that "the subject is receptive only, the accident being caused by an extrinsic agent." Cf. A. 1, ad 1. The failure to distinguish between those extraneous accidents which are inseparable from the subject because due to the determinations of the signate matter, and those which are separable because due to an extrinsic agent, obscures the distinction which must be made between specific and sub-specific natures, and leads St. Thomas to talk of the latter as if they were species because their inseparable accidents resemble properties in one respect, i. e., they are not extraneous in the sense of being extrinsically caused.

[204] The ambiguities and apparent contradictions are the same, whichever of the two theories is treated *as if true*. The rules for interpretating the texts would, of course, be different according to each position. Vd. Part IV, Section 17, *supra*.

distinguishes perfect from imperfect embodiments of the sensitive nature. Perfect and imperfect animals are not species, for then, by the identity of soul and substantial form, or substantial form and specific nature, there would be four souls. The principle on which the argument turns is that each specific nature is a *grade of being*; [205] but perfect and imperfect animals have the same *grade of being,* differing only in the completeness of their animal life, and hence they represent two *modes of life*. On the other hand, there is the passage in the *Summa Contra Gentiles* which says: " if we run through the various species, we find that one species has an additional grade of perfection over another, for instance, animals over plants, and animals endowed with locomotion over those that are immobile " (II, 95).[206] Now it is clear that both views cannot be true. We are not obligated by the principles of the first position to choose one rather than another, yet we must choose between them.[207] If we choose the text from the *Contra Gentiles*, then we must admit at least four souls, and possibly more, since the possession or privation of certain of the specific sensitive powers can also be taken to indicate a degree of perfection, hence a gradation of species. If, however, following the other text, we distinguish " degrees of perfection " according as they are grades of being or modes of living, then the more or less perfect types of animal life are not specifically distinct, and the word " species " in the passage from the *Contra Gentiles* has two meanings: (1) the degree of perfection by which *animal* differs from *plant* makes it truly specific; (2) the degree of perfection by which animals having locomotion differ from animals deprived thereof makes them merely sub-species.[208] In short, to avoid flat contradiction here, one must either find ambiguity in the word " species " in the *Contra Gentiles* passage,

[205] Cf. *Summa Contra Gentiles,* II, 94.

[206] Cf. *In De Anima,* II, 5, #294; II, 6, #301.

[207] Vd. Reply Obj. 2 *contra* I, in which both alternatives were regarded as possible.

[208] In short, not every difference in degree of perfection makes a difference in species, but only such as involve grades of being. St. Thomas says " things may be distinguished in two ways. First, as those which are altogether specifically different, e. g., horse and ox. Secondly, as perfect and imperfect in the same species, e. g., a boy and a man " (*Summa Theologica,* I-II, 91, 5). Here the second statement makes the point which applies to perfect and imperfect animals, as belonging to the same species despite the difference in perfection. The application is, unfortunately, contradicted by the statement concerning horse and ox, for if perfect and imperfect animals are only sub-species of the sensitive nature, how much more so must that be true of horse and ox. The point remains, though the illustration is unfortunate. This inaptitude of example is typical of many places where St. Thomas uses kinds which are sub-species to exemplify a specific distinction.

or be able to suppose that "three souls" means three "genera" of souls, in the passage from the *Summa Theologica*. Since I find it difficult to make this supposition, and find it relatively easy to detect ambiguity in the word "species," I would, if compelled to choose, decide in favor of the position that there are only three species of living things.[209]

The second instance of apparent contradiction concerns the generation of one substance by another unlike it in species. In discussing the production of man's body, St. Thomas argues that the *first* human body was of necessity made immediately by God, because, being first, no other pre-existed whereby another body of the same species could be generated (*Summa Theologica*, I, 91, 2). This does not mean, as the Reply to Obj. 4 makes clear, that the human body was not formed by God out of pre-existing matter; St. Thomas agrees with St. Augustine that "the human body pre-existed in the previous works in their causal virtues," so far as passive potentialities are concerned. It means that no pre-existing creature had the active causal virtues whereby to generate man, according to the operation of secondary causes alone. The principle implicit here can be generalized: creatures of a given species cannot generate creatures of a higher species by the operation of secondary causes in the natural process of pro-creation. The first occurrence of the higher species must be a creation, in the sense that the First Cause is principally operative.[210] On the other hand,

[209] If the degree of perfection due to possession or privation of locomotion, which is a generic power, does not make a difference in species, a *fortiori* the possession or privation of specific sensitive powers does not.

St. Thomas sometimes refers to the five forms as generic. Thus, he writes: "The more perfect form virtually contains whatever belongs to the inferior forms; therefore, while remaining one and the same, it perfects matter according to various degrees of perfection. For the same essential form makes man an actual being, a body, a living being, an animal, and a man. Now it is clear that to every *genus* follow its own proper accidents" (*Summa Theologica*, I, 76, 7, ad 1). Here, it seems to me, the word "species," not "genus," should have been used. What may be meant, however, is that, from the point of view of man's specific nature, all of his properties except rationality follow from the generic constituents of that nature, i. e., the virtually included, inferior forms. It should be noted, furthermore, that here St. Thomas seems to be affirming three forms of life; but it is not clear that the first two distinctions refer to *element* and *mixture*. In fact, one might suppose that there is only one form of non-living substance, namely, *corporeity*. For whatever corporeal substance exists at all exists as a body. Cf. fn. 228, *infra*.

[210] Cajetan, in commentary on this article, expresses the general principle as follows: "the human body, and universally every material thing, is formed immediately either by God or by the composite." But the composite is the efficient cause in generation only when it is a univocal cause: that is, when one thing generates another of the same species. If the thing produced is of another species,

there are several texts in the discussion of the Work of the Six Days, which appear to say the opposite, especially the following one: " Species, also, that are new, if any such appear, existed beforehand in various active powers; so that animals, and perhaps even new species of animals, are produced by putrefaction by the power which the stars and elements received at the beginning. Again, animals of new kinds arise occasionally from the connection of individuals belonging to different species, as the mule is the offspring of an ass and a mare; but even these existed previously in their causes, in the work of the six days " (*Summa Theologica,* I, 73, 1, ad 3). The contradiction is sharpened by the denial of active causal virtues, in one case, and the affirmation of such generative powers, in the other. Nor is the contradiction avoided by dismissing generation by putrefaction as a scientific error; for, in the first place, there is at least a poetic anticipation here of recent scientific discoveries concerning the casual efficiency of various types of radiation to produce mutations in the germ plasm; and, in the second place, the other example, the production of a hybrid by interbreeding of ass and mare, indicates St. Thomas to be saying plainly that two species can produce a third and different species by natural processes of generation.[211] In short, to translate St. Thomas's points here into modern scientific language, new species are generated when germinal mutations are caused by radioactive influences or by hybridization,—in the latter case, of course, only when the hybrid progeny are *inter se* fertile.[212]

If we read the word " species " as univocally intended in all these texts, then we are obliged to choose between contradictory propositions about the origin of species. It cannot be true that new species are *always* created, by some mode of Divine intervention, if it be true that new species are *sometimes* produced entirely by the operation of natural causes, and conversely. The inconsistency is only apparent, however, if " species " is used equivocally; and both propositions can be understood as true. Interpreting the passages in the light of the accepted theory about species, we can see that Divine origin applies only in the case of natures which are

the composite would have to be an equivocal efficient cause in order to generate it. This is impossible. Hence, in the first occurrence of any new species, Divine causality must intervene. Hence, new species are not generated (pro-created) but created.

[211] "Although a mule is unlike a horse or an ass in species, it is like them in the proximate genus; by reason of which likeness one species, a mean species as it were, is engendered from different species " (*De Potentia,* 3, 9, ad 16).

[212] Vd. Dobzhansky, *op. cit.,* Ch. II, III, VIII.

truly specific, ordered as lower and higher grades of being; natural origin,—in which the operation of secondary causes is sufficient,—applies only in the case of sub-species which, though they may differ in degrees of perfection, do not differ in grades of being.[213] This is further supported by the fact that the "species" discussed in Q. 73, A. 1 are not necessarily ordered as higher or lower than one another: the horse and the ass do not differ by the possession or privation of vital powers, and the mule is a mean between them only in the sense of having some of the *accidental* traits of each of them. In short, these two truths are compatible: that creatures of one species cannot generate others of unlike and superior species (*S. T.*, I, 91, 2); that within a species, creatures of one sub-specific type can generate, and in fact do generate, others of different sub-specific type, and the latter may or may not excel in the perfection with which they accidentally embody the specific nature (*S. T.*, I, 73, 1).

We shall discuss the significance of these truths more fully later.[214] Here it is enough to see how the resolution of the issue about species enables us to perform the work of reconciling contrary texts. Furthermore, the fact that this last instance of reconciliation could not have been accomplished had the second position, rather than the first, been chosen as true, confirms our judgment about the relative superiority of the first position.[215]

[213] Cf. Reply Obj. 4 *contra* I, in Part V, Section 20, *supra*.

[214] Vd. the consideration of evolution in Section 27, *infra*.

[215] According to the second position, the word "species" would not be regarded as equivocally used in these conflicting passages, and hence the contradiction between them could not be avoided.

It may be objected, however, that the reconcilation effected is contrary to the sense of Scripture, for *Genesis* speaks of many kinds of animals as created, such as those that live in the water, or on the land, those that creep and those that walk, etc. St. Thomas discusses these matters in dealing with the work of the fifth and sixth days (*Summa Theologica*, I, 71, 72); and enumerates the following as if they were different species: fish, birds, beasts, domesticated or wild, reptiles, quadrupeds, etc. There is no inconsistency here, however. The kinds enumerated are all sub-species. That a variety of sub-specific types of each specific nature was originally created is not inconceivable. Furthermore, there is always the question whether the production of these diverse types was a creation in act or in potentiality,—i. e., in their causes. In any case, our interpretation of *Genesis* depends on the meaning we attach to the word "species." In the passages referred to, St. Thomas must be using the word to mean sub-species, for otherwise his remarks about evolution (cf. 72, 1, ad 5, with 73, 1, ad 3) would conflict with the principle enunciated in the text on the production of man's body. We shall return later to the problem of monophyletic vs. polyphyletic origins, that is, whether within the species *plant* and *animal* one or many original sub-specific types were created in act.

26. *Epistemology and Logic.* We turn now to those aspects of our resolution of the problem of species, which concern our *knowledge* of sensible natures. There are two major considerations: (a) the inadequacy of our knowledge of inanimate substances; (b) the relation of science and philosophy with respect to knowledge of species. In addition we shall deal briefly with a third: (c) the problem of univocal and analogical genera.

(a) In Part III, *supra,* the whole epistemological question was discussed. The issue was there formulated as between the position that we have quidditative knowledge (a real and essential definition) only in the case of one species, *man*; and the position that we possess real definitions of other species as well. As a matter of fact, the latter position was more extravagantly propounded, viz., that we had adequate knowledge of *all* essences. It was said that this issue could not be decided until prior ontological questions were resolved. In the light of their resolution, we can now make the following judgments: first, that we do have quidditative knowledge of other species than *man,* if *plant* and *brute animal* are also infima species; second, that there is some truth in the view of Maritain and Garrigou-Lagrange, namely, that our knowledge of human nature is most adequate, and that our understanding of all inferior species is adequate in proportion as they are proximate to *man,*— our understanding of the sensitive nature being better than our understanding of the vegetative nature, though we possess real definitions of both *brute* and *plant*; and third, that the proposition cannot be maintained in its more extravagant form, for it appeared in the dialectic of the issue that we do not know whether there are two species of inanimate substance or one, nor can we give real definitions of these species with the same certitude as in the case of living things (vd. Replies Obj. 6 and 7 *contra* I).[216]

Only the last of these points need concern us further, not simply because of its epistemological interest, but because it has a bearing on the issue in the philosophy of nature. By approaching the matter tangentially we may be able to discover why the theory of five species, ordered in an ontological hierarchy, broke down in the case of non-living substances. Here the analysis made by the first

[216] What the dialectic has tended to establish is *that there are* five natural species, or some similarly definite small number; but that does not mean we know *what they are* to the same degree of adequacy as we know the essence of human nature. Our knowledge of human nature is helpful in two ways: it helps us to prove *that* there can be only a small number of inferior species, and it helps us to understand what these natures are in proportion to their degree of proximity or remoteness.

position was most unsatisfactory. It could not say anything demonstratively except that the number of inanimate species must be two or less, if the number of souls is three. It may be helpful to ask, therefore, whether the difficulty is due to neglecting a radical difference between living and non-living substances and the character of their substantial forms.

In an essay on the specificity of the philosophic order, M. Gilson has raised a similar question.[217] Gilson, seeking the reason why the Aristotelian philosophy is less at home in the world of modern physical science than the Cartesian, finds an answer in the opposite errors made by Aristotle and Descartes. Descartes, according to the principles of his method, made mathematics the type of all science and anticipated the reduction of all knowledge to mathematical form. Aristotle, contrary to his view of multiple methods,—a method adapted to the distinct formality of each subject-matter,—" exaggerated the scope of one science and the value of its method, to the detriment of the others, and in a sense he was less excusable than Descartes, for in this he came into open contradiction with the requirements of his own method, whereas Descartes was only carrying his through. And yet, philosophically, Aristotle's was the less dangerous error, for it was an error of fact, and left the principle untouched: to biologize the inorganic, as he and the mediaeval philosophers did, was to condemn oneself to ignorance about those sciences of the inorganic world whose present popularity comes chiefly from the inexhaustible fertility which they display in things practical; but to mathematize knowledge entirely, and on principle, was to set strange limits to physics and chemistry, and to make impossible biology, metaphysics and consequently moral theory." [218]

The situation is more complicated than Gilson appears to see. The two subject-matters which, according to Gilson, Aristotle failed

[217] This is included as Chapter III in *Le Réalisme Methodique* (Paris, 1936). It also appeared in English translation as a contribution to *Philosophy and History*, essays presented to Ernst Cassirer (Oxford, 1936). The page references are to the English volume.

[218] *Op. cit.*, p. 71. Aristotle's error is one of not following his own fundamental insight. "An Aristotelian discourse on *method* is an impossibility; it is possible to speak only of a discourse on *methods*." For each of the divisions of the real, there is an appropriate method of knowledge. These specific methods, though related by the fact that " the method of a more abstract science dominates that of the more concrete sciences," nevertheless are distinct, " inasmuch as every order of the real requires by reason of its very distinctness an appropriate method of investigation." Metaphysics is " the science of being as being; mathematics is the science of quantity; physics is the science of beings capable of movement, biology of living beings, psychology of rational beings, and sociology of human beings living in society " (*ibid.*, pp. 71-72).

to investigate by appropriately distinct methods are the realms of living and non-living things. In the modern division of the investigative natural sciences these are the spheres of biology-psychology and physics-chemistry, respectively. But both subject-matters fall within the scope of the philosophy of nature, as determined formally by the lowest grade of abstraction. Gilson, here as elsewhere, insists upon ignoring the philosophy of nature as a major division of philosophical knowledge, not only formally distinct from mathematics and metaphysics, but also from all the natural sciences.[219] In consequence, where Gilson finds Aristotle departing from his own principles in only one respect, we must acknowledge two inadequacies in the Aristotelian procedure, inadequacies which the middle ages did not remedy. Because of their cultural circumstances, Aristotle and St. Thomas did not and could not distinguish between philosophy and science, as we, who have witnessed the independent development, and hence the relative autonomy, of the sciences during these last three hundred years, are compelled to do. This failure has the most serious consequences in the sphere of *ens mobile*, because the philosophy of nature and the natural sciences are constituted by the same formal object *generically*. The Aristotelian error, which Gilson partially discusses, is, therefore, this double one: a confusion of scientific and philosophical questions concerning *ens mobile*, and a transference of concepts appropriate in the case of living substances to a field in which they are inappropriate, i. e., the analysis of the inorganic. That Gilson's account of the error is incomplete does not, however, render invalid the one point he is making. With the qualifications indicated, we can read the following passage as saying that Aristotle's philosophy of nature is defective because it tried to comprehend a real heterogeneity by a set of concepts insufficiently differentiated.

[219] His enumeration of the sciences, reported in fn. 218, *supra*, indicates that Gilson identifies philosophy with metaphysics, and that he fails to distinguish the philosophical from the scientific approach to the subject-matters which he calls by such names as "physics" or "biology" or "psychology." That this is not an accidental slip here is plainly shown by the whole tenor of Gilson's argument in *The Unity of Philosophical Experience* (New York, 1937), esp. Ch. XI and XII. In short, Gilson, failing to distinguish formally the whole sphere of philosophy from the experimental or investigative sciences,—the distinction Maritain makes between ontological and empiriological knowledge,—necessarily violates the Thomistic division of the grades of knowledge according to the grades of formal abstraction, as that is made in the commentary on the *De Trinitate* of Boethius. The violation consists in regarding the divisions within the sphere of *ens mobile*,—e. g., living and non-living bodies,—as if they generated an order of sciences, biology and physics, distinct in the same way as the whole of the philosophy of nature is distinct from mathematics and metaphysics.

Aristotle's error lay in not being true to his principle of *a science of the real for every order of the real,* and the error of mediaeval philosophy lay in following him in this. Committing the opposite error to that of Descartes, Aristotle set up the biological method as a physical method. . . . The fact is that Aristotle was before everything a naturalist, just as Descartes was before everything a mathematician; so much so indeed that instead of reducing the organic to the inorganic like Descartes, Aristotle claimed to include the inorganic in the organic. Struck by the dominance of form in the living being, he made it not only a principle of the explanation of the phenomena of life, but even extended it from living beings to mobile beings in general. Hence the famous theory of substantial forms, the elimination of which was to be the first care of Descartes. For a scholastic philosophy, as a matter of fact, physical bodies are endowed with forms from which they derive their movement and their properties; and just as the soul is a certain species of form,—that of living being,—so is form a certain genus of soul,—the genus which includes both the forms of inorganic beings and the forms or souls of organized beings.[220]

The main point here is that the concept of substantial form cannot be univocally employed in the philosophical analysis of living and non-living things. This does not mean that the concept is equivocal, for, as Gilson says, " there is no question of denying the hylomorphism of inorganic beings, but what does seem necessary is a radical severance of the idea of organic form from the idea of inorganic form." [221] The correct procedure is to use this basic concept analogically. " Every ' nature ' requires a formal principle, but not every form is living." If we may use the word " ratio " to name

[220] *Op. cit.,* p. 72. Gilson adds: " This explains the relative sterility of the scholastic philosophy in the order of physics and even chemistry, as well as the inadequacy of Cartesianism in the order of the natural sciences. If there is in the living being anything other than pure mechanism, Descartes is foredoomed to miss it; but if there is not in physical reality that which defines the living being as such, then the scholastic philosophy will not only fail to find it there, but will never discover even what is there. Nevertheless, it wasted its time in looking for what was not there; and as it was convinced that all the operations of inorganic bodies are explained by forms, it strove with all its might against those who claimed to see there something else. . . . Three centuries spent in classing what must be measured, as today some persist in measuring what must be classed, produced only a kind of pseudo-physics, as dangerous to the future of science as to that of philosophy which imagined itself bound to it; scholasticism was unable to extract from its own principles the physics which could and should have flowed from it " (*ibid.,* pp. 72-3). In this passage are discernible the results of Gilson's failure to distinguish and relate science and philosophy, for it is not true that the only appropriate method in the case of the inorganic is measurement, and that classification must be restricted to the organic. The philosophy of nature is concerned with species in both cases, and the natural sciences can proceed empiriometrically and empirioschematically in both cases.

[221] *Op. cit.,* p. 74.

substantial form in the sphere of non-living things, we can say that *ratio* and *soul* are analogous as substantial forms. The idea of form is fundamentally metaphysical; it not only signifies a kind of being, but also the kind of being which is conferred upon matter through union with form. For the same reason that being is analogical, form is. "It is sufficient to recall," writes Gilson, "that every metaphysical idea arises, upon contact with the most general facts of our material universe, from a judgment made in the light of being,—that is to say the light of the principle of contradiction,—and that consequently any such idea is analogical, like the idea of being itself. Such is the concept of form, realized differently in organic beings and living beings." [222]

The bearing of this point on our problem of species is direct. If substantial form is analogical in the two orders, so must be the essences, species and properties of living and non-living things. According to a strict analogy of proportionality, substantial form is both the same and different in the two orders: the same insofar as it is the first act and the essential nature of the substances constituted by the union of prime matter and substantial form, and insofar as it is the principle of specificity and the source of proper accidents in the substances thus constituted; but different because a different mode of being, and hence of unity, results from *soul* and *ratio*,—using these words to name the two kinds of forms. The difference is vaguely suggested by the word "inorganic" which we apply to non-living substances. The way their *number* can be increased or diminished by quantitative separations or aggregations reveals the relatively unorganized character of these substances. Let us suppose for a moment that *body* is the only substantial form other than the three souls. Then matter informed by the ratio of *corporeity* exists in as many individual substances as, at a given time, there are separate quantitative units, each of which is a singular subject of accidental change, of action and passion. But these units are capable of aggregation and division, and thus the number of bodies is diminished or increased. Only amongst the lowest types of life, can the number of substances be increased by division, and then only under special conditions, for every living thing is a heterogeneous whole: two such wholes will not result

[222] *Op. cit.*, p. 74, fn. 1. "Since the human mind never thinks without appealing to the imagination and to sensuous experience, reason is naturally tempted to attach concepts which are metaphysical, and consequently analogical, to this or that image and univocal realization. It was to such an allurement that Aristotle yielded, his medical education tempting him to 'biologize' form in its whole extension" (*loc. cit.*).

from any sort of division. Further, two or more living wholes never become a single living thing by aggregation, whereas because of their homogeneity two bodies can unite to become one. The relation of quantity of matter to substantial form is different in the organic and the inorganic.

If all inorganic individuals are specifically the same,—that is, if they are all bodies, with no further essential distinctions,—then the accidental diversity we find among bodies must be due primarily to quantitative determinations.[223] Since the properties of a substance flow constantly from its substantial form, and since property is always power, all bodies must agree in having the same properties, and these could only be the passive potentialities which underlie accidental change, the sort of accidental change which is always transitive motion and in which the subject of change merely loses one privation to gain another.[224] But according to their differences in various quantitative dimensions, bodies possess these powers in different degrees and different respects: they not only have more or less of the same properties, but one accidentally constituted type of body moves differently with respect to bodies of other types. That is why, as Gilson points out, the measurement of bodies, in all the dimensions in which measurement is possible, has enabled modern physics and chemistry to give us much better *scientific* knowledge of inorganic things than the ancients possessed. And we can interpret this knowledge properly, in its bearing on the hylomorphic constitution of non-living substances, only if we under-

[223] St. Thomas opposed the notion that there is only one inorganic substantial form, namely, *corporeity*. "If corporeity were one form in itself, on which the other forms which distinguish bodies, supervene . . . this form would inhere in matter immutably, and so far all bodies would be incorruptible. But corruption would then be merely accidental through the disappearance of successive forms,—that is to say, it would be corruption, not pure and simple, but partial, since a being in act would subsist under the transient form. Thus the ancient natural philosophers taught that the substratum of bodies was some actual being, such as air or fire" (*Summa Theologica*, I, 66, 2). But this is one respect in which the ancient materialists may have been right, namely, that all non-living matter exists only as bodily substance, and that all inanimate bodies differ only accidentally from one another. The consequences for the theory of substantial change in the sphere of the inorganic are tremendous: strictly, as St. Thomas points out, bodies could change only accidentally, if all bodies agree in having the same substantial form, *corporeity*; corporeal matter would be, in this sense, incorruptible and ingenerable. We shall discuss these points in a subsequent article devoted to substantial change. Vd. fn. 225, *infra*.

[224] In contrast, vital powers are potentialities of immanent action, and of impassible change in which the subject is perfected, i.e., gains formally without suffering privation in consequence.

stand the role of quantity in the nature of these substances: both in relation to their form, unity, and number; and also as the source of their accidental diversity, their distinction into types, not species, according as the same properties are manifested in accidentally different ways.[225]

The main question remains unanswered, however. In addition to a diversity of accidental types of body, are there specific differences? More precisely, the question must be, are there two species of inorganic substances, two corporeal *ratios*, as there are three *souls*? The answer depends on whether some bodies possess certain powers in addition to all the powers possessed by other bodies; thus, for example, some bodies might have the power of local motion alone, whereas others might have, in addition, powers of alteration and quantitative change. Furthermore, the answer depends on whether such a difference in power constitutes a grade of being. If locomotion, in the case of vital powers, does not signify a grade of being, but only a mode of life, it may be that the possession of certain additional potentialities does not establish one sort of body as substantially superior to another.[226] And even if it could be decided that there was only one inorganic substantial form, multiplied in existence by a diversity of accidental types,

[225] "The determinist speaks of physical entities as of things entirely determined in themselves; he gives them as do, among others, the greater part of modern scholastics, a sense directly ontological. But we forget that experimental science is able to attain in things only what lets itself be measured in numbers. . . . One cannot conclude from metrical cuts to ontological cuts. The sun and the moon are not two substantial beings because distant and separated by a certain void. The distance and the void, such as defined by experimental science, are not susceptible of an immediate ontological transposition. It is then that one borders on an atomistic philosophy of nature. The fundamental entities of physics only symbolize the metrical cuts in things, of which they only represent an aspect. It is absurd to consider an atom as a thing. These entities are only real in the fashion of a smile. It is senseless to talk of the hylomorphic constitution of a smile, even if the smile finds its final cause in rationality, and that supposes matter and form" (DeKoninck, *Le Problème de L'Indetérminisme,* pp. 98-99). Cf. Maritain, *Degrees of Knowledge,* p. 219, fn. 2; and Schmieder, "Some More Casual Notes on the Nature and Structure of Inorganic Matter," *The New Scholasticism,* XIV, 1, pp. 33-56. For statements of the "scholastic position, that the types of bodies which physics and chemistry distinguish are species of substance, vd. Phillips, *Modern Thomistic Philosophy,* I, pp. 40-43; and McWilliams, *Cosmology,* pp. 192-3.

[226] There is one text in St. Thomas which appears to say that elements and mixtures are hierarchically ordered as lower and higher species, even though the latter forms "do not extend to any operations that cannot be accomplished by the aforesaid qualities," i. e., the qualities which signify the operations consequent upon the elemental forms (*Summa Contra Gentiles,* II, 58). This seems contrary to the principles we have accepted. If the facts are as described, there cannot be two species of inorganic substance. Cf. fn. 209, *supra.*

there would still remain the problem of how this lowest species in the hierarchy of substances was constituted, since no lower nature could enter into the composition of its essence.[227] Gilson's insight does not solve these questions, but it may eventually contribute to their solution. In the first place, the traditional analysis of inorganic substances may have been profoundly misled, as Gilson suggests, by the univocal treatment of substantial form in the spheres of living and non-living. In the second place, because of the resulting blindness, we may have failed to see the hylomorphic significance of the knowledge of inorganic phenomena contributed by modern physics and chemistry. If, freeing ourselves from traditional prepossessions, we approach the whole problem of the inorganic freshly and are, therefore, able to read the scientific evidences in their own terms before giving them ontological significance, we may succeed in understanding the nature of the inanimate, in regard to species and property. The resolution of the problem of species must remain imperfect until work is done which will make the accepted theory as intelligible and adequate in its treatment of the inorganic, as in the case of living things.

(b) We shall proceed *pro tem*, however, as if the accepted theory were true in one of its chief contentions, namely, that the number of natural species is either five or some similarly definite, small number.[228] This truth yields an interesting corollary with respect

[227] Vd. Obj. 7 *contra* I, in Part V, Section 20, *supra*.

[228] As I have indicated, it is possible that there is only one inorganic substantial form, and hence only one species of non-living corporeal substance. The problem of determining the generic constituent in such a nature remains unsolved, nevertheless; it cannot be prime matter, since the generic component of the essence must be determinate, and there is no inferior species which can be virtually included in the essence of *body* if "body" names the lowest species, as well as the only species of inorganic substance. Though this problem remains unsolved, it is worth considering the possibility of one inanimate species (body) as opposed to the possibility of two (element and mixture). There is also the possibility that there are only two species of living things, instead of three. There is some scientific evidence for the opinion that plants and brute animals differ only accidentally; and this evidence is confirmed by the insight that the *telos* of plant and animal life is the same, i.e., brute animals do not use their cognitive powers for a speculative, but rather for a vegetative, end. Combining these two possibilities, we are led to the hypothesis of three species of corporeal substance: *bodies, living things,* and *man*; or what might be regarded as three grades of terrestrial existence: *matter, life,* and *mind*. Cf. J. S. Haldane, *Mechanism, Life and Personality,* New York, 1913; and *The Sciences and Philosophy,* New York, 1929.

These various possibilities indicate how the position that there is a small number of species must be understood. It has the following latitude: at the lower limit, *three* is the least number; at the upper limit, *ten* is the greatest number; and *five* is the traditional number. Cf. fn. 209, *supra*.

to the relation of the natural sciences to the philosophy of nature. The two sorts of knowledge of sensible things can be sharply distinguished according to essence and accident: species, and all that pertains to species, are the object of the philosophy of nature; accidental types, and all that is relative thereto, are the object of natural science. Thus, in the case of living things, the philosopher defines and orders the several species, determines their properties, analyzes their operations in the light of these powers, and is concerned only in a general way with the diversity of the accidental embodiments of these natures, especially the significance of this diversity for questions about contingency and mutability. The scientist describes and classifies the accidental types according to systematic categories; he deals with those contingent accidents which are uniformly and constantly correlated, and investigates the patterns of change which are manifested by any one type or by the mutability of things in general. As empiriological, science is not knowledge of substances and causes, but of phenomena and their connexion. This, however, is only a formal restriction of the object of scientific knowledge. The phenomena which science studies must be ontologically rooted, and the connexions are manifestations of the causal nexus. The scientist need not acknowledge this in order to do his work, but if he wishes to understand what his knowledge is ultimately about, then he must either turn philosopher or go to the philosopher for insight. Interpreted ontologically, the scientific investigation of phenomena and their connexion ultimately yields knowledge about substances, not in their specific natures, but in their accidental types. We are thus able to distinguish philosophy and science in two ways: first, in terms of restrictive formal object (*what is known, according as it is known*), whereby philosophy is ontological in aim, and science is non-ontological or empiriological in aim; second, in terms of ultimate material object (*that which is known, according as it is*), whereby philosophy is knowledge of the essential (specific natures) and science is knowledge of the accidental (sub-specific types), both with respect to existing things or substances.[229]

[229] Cf. Maritain's distinction of natural philosophy and natural science in *The Degrees of Knowledge*. The important difference is that Maritain attributes to the sciences a knowledge, however inadequate, of the specific diversity of sensible things, which lies below the threshold of philosophical analysis. Curiously enough, Rousselot, though denying that philosophy (*scientia*) has adequate knowledge of natural essences, nevertheless assigns to art and history, a knowledge of sub-specific, accidental types. What Rousselot means by art and history we would call empiriological science. Vd. *The Intellectualism of St. Thomas*, pp. 125-132.

There is, thus, a clear division of labor between the work of philosophy and of science in knowing nature. If each of the disciplines fully recognized this division, it would be relieved of problems beyond the scope of its method and profit by the supplementation to be derived from the other. Knowledge of the accidental, whether of sub-specific types and classes, or of the correlation of accidental traits, or of the uniformities of accidental change, requires a kind of research that is no part of philosophical inquiry; and it is equally true that knowledge of the essential, whether of specific natures or of their properties, requires a mode of analysis which exceeds the investigative and conceptual procedures of science.[230]

Science supplements philosophy by ordering and relating the vast diversity of sub-specific concretions in all the dimensions of their phenomenal manifestation. Ultimately this is achieved either by measurement or by classification, wherefore Maritain distinguishes between empiriometric and empirioschematic sciences. The empiriometric are the mathematico-physical sciences; measurement is the indispensable condition for the application of mathematical analysis to the phenomena of nature. These sciences are especially fruitful in the sphere of the inorganic, where quantity is the supreme accident, but they are not limited thereto, for biological phenomena are also susceptible of measurement and hence to mathematical formulation.[231] There is even some reason to think that because it deals with accidents, science should be fundamentally metrical and mathematical, and only secondarily schematic or taxonomic. This does not mean that measurement can ever replace classification, but rather that all scientific classification will ultimately rest upon measurement. Species do not differ from one another by more and less of the same character; but sub-specific differences, whether of accidental classes or of individuals, are typically matters of more and less.[232] In short, scientific classifications and orderings

[230] This difference in object, and hence in method of inquiry and mode of thought, manifests itself in the radical difference between the relational logic of science and the predicational logic of philosophy.

[231] The fact that all systematic classes are statistical arrays, and the fact that systematic species are mutable at a given rate of change under a variety of cooperating and counteracting factors, indicate that genetics is already becoming a mathematical, empiriometric science. The present accomplishment of Sewall Wright and others portends a great development of biology by methods long familiar in mathematical physics. Vd. T. Dobzhansky, *Genetics and the Origin of Species*, New York, 1937: Ch. V, VI.

[232] "In so far as substance is with matter, i. e., in respect of material dispositions, more and less are found in substance" (*Summa Theologica*, I-II, 52, 1). Cf. *ibid.*, 72, 8, ad 1.

are constructed within fields of continuous variation. The continuity of nature, or more precisely the diverse continua in which natural things can be ordered, is the primary accomplishment of scientific classification. This is most evident in the case of inorganic phenomena, where the ordering is derived from all sorts of measurement and calculation; but it is gradually becoming more evident in the genetic approach to the classification of plants and animals. Every accidental class is a cut in a continuum. Thus we see how the physical and biological sciences complete our knowledge of nature by the quantitative continua and accidental classifications which confer order and intelligibility upon the infra-specific variety of substances.

Philosophy supplements science by placing these various continua and accidental schema within the hierarchy of specific natures. As accidents are rooted in substances, so the accidental embodiments, to which natural essences are subject, have their principle in substantial form and matter. Hence the scientific findings cannot achieve ultimate intelligibility except in the light of philosophical analysis which apprehends the gradations of being in nature. In each grade of being, as constituted by a specific nature, there is a vast accidental variety. Science may succeed in arranging and relating the terms of this variety, but it cannot explain the fundamental discontinuities which separate one system of variation from another. It can distinguish things according to their modes of operation, and measure the typical actions and reactions of their mutability, but it cannot see how the range of operation and mutability is limited, for every sort of thing, by the powers conferred upon it by its essential nature. Although it deals only with contingent accidents, science is concerned with universals,—with types and classes rather than individuals,—and, therefore, must distinguish between separable and inseparable accidents, the latter transcending the vicissitudes of individual existence; but the explanation of this distinction in terms of matter and form, first act and second acts, is the work of the philosopher. In short, natural science contributes a rich assortment of materials, but the comprehensive picture of nature as embracing both necessity and contingency, both hierarchy and continuity, is philosophical. As we shall see, the philosophy of nature cannot give an adequate account of the diversity of things without relating two different sorts of order: the hierarchy of specific gradations, and the continuities of infra-specific variation.[233] The division of labor is not merely that

[233] Vd. Section 27, *infra*.

science provides us with knowledge of the latter, and philosophy of the former; to philosophy also falls the task of the comprehensive analysis which includes both sorts of knowledge in proper ordination.

If philosophy and science be thus well-ordered in the study of nature, the transgressions of undisciplined scientists and philosophers can be corrected or avoided. The scientist who denies or neglects philosophy, and regards his sort of research as making the only contribution, is likely to indulge in pseudo-philosophical generalizations about the absolute continuity of natural things, a continuity in which there are merely accidental, and often arbitrary, differences between the least complicated, inert body and the most complex, living thing. The philosopher who does not understand the difference between his problems and those of the scientist, is likely to misinterpret the evidence which the latter offers by trying to make accidental classifications the basis for specific distinctions. The philosopher's misapprehension of infra-specific continuities is as serious an error as the scientist's denial of hierarchy. We have already noted instances of this philosophical error: the misinterpretation of botanical and zoological taxonomies as evidencing a great diversity of plant and animal species; and, even more egregiously, the misreading of the metrical accomplishments of physics and chemistry as pointing out the species of elemental and mixed bodies. Until the latter error is corrected, we shall not be able to overcome the tendency to employ the concept of substantial form univocally in the case of living and non-living things.[234]

The ordering of natural science and the philosophy of nature, which follows from resolving the issue about species by accepting the first position as true, has several virtues: (1) it divides their labors clearly; (2) it combines their accomplishments harmoniously; (3) it shows the relative autonomy of each; (4) and, most important of all for the philosopher, it prevents him from falsely " ontologizing " scientific findings, by treating all universal distinctions as if they signified essences and hence converting accidental types or varieties into substantial species.

(c) There are two consequences of this resolution with respect to logical considerations. The first has to do with the analogical and univocal significance of universal terms predicated as genera and species. We have already seen that a universal is applied univocally only when it is predicated with strictly categoreal signifi-

[234] Vd. the discussion of Gilson's insight concerning the failure of hylomorphic analysis of inorganic substances, in this section at (a), *supra*. Vd. fn. 223 and 225, *supra*.

cance, and thus it is said equally of all the things to which it applies; when, however, it is predicated with any transcendental significance,—as a participation of being or good, etc.,—then it is said unequally of things graded in being, and hence analogically.[235] Since ontology is always concerned with the being of things, ontological predications are analogical; thus, if we predicate " living " as a universal common to plants, animals and men, or " cognitive " as a universal common to animals and men, it is said analogically of them because they are diverse grades of being; similarly, in the case of " substantial form " said of living and non-living things. It is only in purely logical discourse that we find univocal genera, said equally of diverse species not ordered as higher and lower in being. By this criterion we know that whenever *man* and *brute*, for example, are treated as species of a univocal genus, such as *animal*, the discourse is logical.[235a]

There is no difficulty about applying this criterion in the case of specific natures which are grades of being. We know that anything which is common to two species must, if regarded ontologically, be analogical.[236] But there is a problem about all the sub-specific types, such as the systematic classes of biological classification. On the one hand, it would appear that the varieties of *plant*, for example, all participate equally in the vegetative nature.[237] On the other hand, among the varieties of *plant*, some are more perfect than others in this or that accidental respect; there is a progression from lower to higher types of vegetative existence; as there is also in the case of more and less perfect animals, with respect to modes of sensitive life. Furthermore, within each of the species, there is a logical hierarchy of sub-specific classes, arranged as more and less general, more and less inclusive in extension or determinate in comprehension. So far as logical discourse is concerned there is

[235] Vd. Part IV, Section 15, *supra*, and esp. fn. 84.

[235a] " The more common universal may be compared to the less common, as the whole, and as the part. As the whole, considering that in the more universal is potentially contained not only the less universal, but also other things, as in *animal* is contained not only *man* but *horse*. As part, considering that the less common contains in its idea, not only the more common, but also more: as *man* contains not only *animal*, but also *rational*" (*Summa Theologiae*, I, 85, 3, ad 2).

[236] Vd. fn. 189, *supra*. When we regard men and brutes as sharing a sensitive nature, we recognize that what they possess is only analogically the same, for man is eminently sensitive whereas brutes are simply so. When Aristotle, in the *Ethics*, discusses the brutal type of man, he is obviously speaking analogically, for the brutal man is worse than brutes precisely because he is a rational-brute.

[237] "A species of substance is (not) shared among different individuals in a greater or lesser degree" (*Summa Theologica*, I, 93, 3, ad 3).

no problem here, for in such discourse all generic predications are univocal.[238] But if we wish to consider the sub-specific types ontologically, we must face the question whether we say "animal" of *oyster* and *elephant* analogically or univocally. Essentially, *oyster* and *elephant* are equal, for both have the same specific nature; accidentally, however, they are unequal, for one is an imperfect, the other a perfect, animal. The question must be answered in two ways, therefore. The principle of the answer can be generalized thus: whenever, in ontological discourse, we refer to the specific nature possessed by various sub-species, the reference is univocal with respect to the common essence which is participated, but analogical with respect to the mode of participation in that essence, according to accidental degrees of perfection. The reference will always be univocal, but it may not always be analogical, since it is not clear that every pair of sub-species is ordered as more and less perfect. Thus, although an animal nature may be regarded as belonging analogically to *invertebrate* and *vertebrate, fish* and *mammal*, insofar as they differ with respect to accidental perfections, it may be necessary to regard that nature as belonging univocally to *horse* and *cow*. The correct solution of this question in particular cases will depend on our ability to determine the levels of accidental perfection among the infra-specific types.[239]

The second logical consideration concerns the divisions of the philosophy of nature in relation to the number of substantial species distinguished. According to the principles of the *Posterior Analytics*, there should be as many formally distinct sciences as there are natural essences known. We are using the word "science" here to mean nothing more than a formal division of the philosophy of nature. The principle would require five such special divisions if there are five species. But, even if we affirm five species, according to the first theory, it does not follow that we shall be able to develop five independent philosophical analyses. The reason is the one which Maritain suggests, namely, that the principle holds only "if we could know essences exhaustively (*adequate ut sunt in se*)."[240] Now, to affirm that there are five species; to claim that we

[238] It is true, of course, that the systematic classes of the biologist are strictly not genera and species of substance, but of accidental concretions, in the category of substance only as works of art are, i.e., reductively. From the point of view of the logician, however, it makes no difference whether what he treats as genera and species are substantial or accidental terms.

[239] We shall return to this point, and to the related question of the ordering of individuals, as more and less perfect embodiments of sub-specific types, in Section 27, *infra*.

[240] *Degrees of Knowledge*, p. 41 and fn. 2.

can offer real definitions in the case of three, from which we can argue indirectly about the distinction of the other two; to admit, furthermore, that in the case of living species we understand the vegetative and sensitive natures in the light of our reflexive knowledge of human nature and its powers; all of this is tantamount to confessing that we do not know these essences exhaustively as they are in themselves. Hence, there are two special divisions of the philosophy of nature, dealing with the inorganic and the animate; or at best three if we try to consider the infra-human living species separately, although strictly our knowledge of these natures is included in our knowledge of man.[241] In the light of these facts, the account given of the " sciences " in the *Posterior Analytics* becomes more and more perplexing. Not only does Aristotle write as if there were many more distinct " sciences " than there are; but he formulates their logical structure in a manner that does not agree at all with the actual organization of the philosophy of nature as a body of knowledge, either generally, or in the few special divisions which have been developed.[242]

[241] There are clearly two divisions, of which one could be called " psychology " because it deals with substances as besouled. This one treats of the vegetative and the sensitive natures according as the powers of these souls are human powers, by virtual inclusion of the inferior souls. The other, more difficult to name, deals with substances having the analogical substantial form we have called a " ratio." This part of the philosophy of nature is as yet very inadequately developed. Cf. my discussion of these matters in *What Man Has Made of Man* (New York, 1937): Notes 23, 32a, 36c, 39c, 45a. Cf. fn. 228, *supra.*

[242] Since the *Posterior Analytics* is even less applicable to metaphysics than to the philosophy of nature, and obviously cannot be an account of the structure of experimental science, the only body of knowledge which Aristotle can have in mind is mathematics, in its Greek development,—certainly not in its modern form.

There are other difficulties with the *Posterior Analytics* as an account of *scientia,* if what is meant is a body of philosophical knowledge, such as the philosophy of nature. The kind of properties which Aristotle seems to think it is the business of scientific knowing to deduce from, and demonstrate in terms of, the essence, is the kind we have distinguished as " logical " rather than ontological, such properties as risibility, grammatical ability, etc. Vd. fn. 175a, *supra.* The distinguishing mark of such properties is that they flow from the conjunction of the difference and the genus, e. g., man can laugh because he is rational and has animal organs. In contrast, strictly ontological properties, such as rationality and sensitivity, are powers which flow from the differential nature and the generic nature, respectively, and the former must be regarded as a specific property, the latter as a generic property, of man. Vd. *S. T.*, I, 77, 1, ad 7; also *ibid.*, 76, 7, ad 1. Cf. fn. 209, *supra.* Now, it appears that we do not know any " logical properties " except in the case of man; it seems impossible to name the properties which flow from the generic and differential natures *as conjoined* in the essence of *brute* or *plant* or *body.* The sort of " science " which the *Posterior Analytics* would lead us to expect in the case of the most obvious natural species does not seem to be possible; at least we

27. *Philosophy of Nature.* The resolution of the problem of species has consequences for two subordinate problems in the philosophy of nature: (a) the problem of the ordering of sub-species, both in their several ranks and with respect to diverse classes of the same rank; and (b) the problem of evolution, or the mutability of sub-species. Both questions must be answered in the first instance by the biological scientist, and, as we shall see, the questions are so related that the same facts are relevant to both.[243]. Although knowledge about sub-species,—their order and mutability,—is the province of science, the scientific facts about sub-species raise philosophical questions concerning their modes of being and of becoming.

Both questions pertain to the sphere of living things. There are parallel questions about inorganic substance, but the inadequacy of our philosophical analysis here does not permit us to solve them by interpreting the evidences afforded by scientific physics and chemistry. The direction which such solutions may take is, however, suggested by the ensuing discussion of animate sub-species. We shall consider the two problems in the order indicated.

(a) Some preliminary remarks may be useful by way of bringing the first problem into focus. In the first place, the traditional discussion of species did not take explicit account of something intermediate between the substantial form (or specific nature) and the individual character. An infima species was traditionally regarded as subsuming individuals immediately, and the only problem was

know that no such thing has ever been developed. Nor can it be said that Aristotle must be thinking of the other kind of property, i. e., strictly ontological properties, or powers, because unless these are known prior to our definition of the essence, we cannot attain to the knowledge which such definitions express. And if they are known prior, if they are the means by which we demonstrate the essence, the essence cannot be the means by which we demonstrate such properties. In short, I am compelled to suggest that the truth of the first position concerning species, and all that it entails, requires a radical revision of the doctrine of Aristotle's logic as an account of philosophical knowledge. It would have to be as radically, if not more drastically, revised to make it applicable to "scientific knowledge," meaning thereby modern empirical science. Vd. fn. 282, *infra.* I am not sanguine that much can be saved, unless one is motivated by such improper considerations in philosophical work as a desire to save Aristotle's face. I shall try to deal exhaustively with these matters in a later series of problems for Thomists concerned with logical questions.

[243] "It is the business of experimental science to tell us how this cosmos of "fluxibilia" has been molded. This role pertains to experimental science precisely because in this domain one could not make rigorous deductions in terms of necessity" (C. DeKoninck, "Réflexions sur le problème de l'Indetérminisme," *Revue Thomiste,* XLIII, 2, p. 236).

about the way individuals of the same specific nature differed. But we have found it necessary to interpose a *tertium quid*,—a sub-specific character,—between individual and infima species.[244] This means that individuals of the same species differ not only individually but racially,—using the word " race " to stand for all sub-specific ranks; and, although both are accidental, racial and individual differences are clearly not of the same sort. The situation is further complicated by the fact that within the area which is covered by the concept of race or sub-species, the scientist distinguishes many groupings which he calls races, species, genera, families, phyla, and so forth. We must, therefore, not only be able to give an ontological account of the sort of nature which is neither specific nor individual, but we must consider whether the diversity of sub-specific ranks has any ontological significance.

In the second place, two sorts of progression from lower to higher forms have been traditionally recognized: one, the hierarchical order of species as grades of being, essentially distinct; the other, the more or less continuous progression from lower to higher accidental embodiments of each specific nature.[245] In view of all the scientific facts about sub-species, bearing on the continuity and discontinuity of individuals according as they are grouped under this or that sub-specific category, we are forced to reconsider the whole question of hierarchy and continuity; and, particularly, we must examine the various sub-specific progressions from lower to higher.

Since all of these questions require us to combine scientific evidence and philosophical analysis, it is necessary to clarify our vocabulary because many of the words we must use belong both to scientific and philosophical terminology. This can be simply done by adopting the following conventions: whenever we are referring to species and sub-species as philosophically distinguished we shall use the words " Species " and " Race," with capital letters; whenever we are referring to the different sub-specific levels which the scientist distinguishes, we shall use the words " race " and

[244] The interposition of sub-species is required by the facts; it is clear that *cow* and *horse*, or *whale* and *spider*, are " natures " in which many individuals participate, and yet, according to the theory we have accepted, they all participate in the same infima specific nature, *brute animal*. The rejected theory also admits sub-species; modern scholastics have found it necessary to distinguish between natural and systematic species, the latter being sub-species. The main difference between the two positions is on what shall be regarded as species (natural) and as sub-species (systematic).

[245] Vd. Aristotle, *Historia Animalium*, VIII, $588^{b}4$-22; St. Thomas, *Summa Contra Gentiles*, II, 91.

" species," with small letters. The scientist also speaks of genera, families, phyla, etc., but these words are not troublesome because we have no need for them in ontological discourse.[246] What is not so simple, however, is to separate the meanings of such words as " hierarchy " and " discontinuity," as they occur in the two vocabularies. The following passages from a scientific discussion indicate the need for clarification.

Organic diversity is an observational fact more or less familiar to everyone. . . . A more intimate acquaintance with the living world discloses another fact almost as striking as the diversity itself. This is the discontinuity of organic variation. If we assemble as many individuals living at a given time as we can, we notice at once that the observed variation does not form a single probability distribution or any other kind of continuous distribution. Instead, a multitude of separate, discrete distributions are found. In other words, the living world is not a single array of individuals in which any two variants are connected by unbroken series of intergrades, but an array of more or less distinctly separate arrays, intermediates between which are absent or at least rare. Each array is a cluster of individuals, usually possessing some common characteristics and gravitating to a definite modal point in their variations. Small clusters are grouped together into larger secondary ones, these into still larger ones, and so on in an hierarchical order. The discontinuity of organic variation has been exploited to devise a scientific classification of organisms. Evidently the hierarchical nature of the observed discontinuity lends itself admirably to this purpose. For the sake of convenience, the discrete clusters are designated races, species, genera, families, and so forth (T. Dobzhansky, *Genetics and the Origin of Species*, p. 4).

The scientific classification of organisms is founded on the discontinuity and the hierarchy of variations, or, to put it more precisely, these properties of variation have been used for the purpose of making a classification. . . . A system based on the empirically existing discontinuities in materials to be classified, and following the hierarchical order of the discontinuous arrays, approaches most closely to the ideal natural one. . . . The subdivisions of the animal and plant kingdoms established by Linnaeus are, with few exceptions, retained in modern classification, and this despite the enormous number of new forms discovered since then. These new forms were either included in the Linnaen groups, or else new groups were created to accommodate them. . . . The system of Linnaeus recognized only four hierarchical ranks: beginning with the lowest, they were species, genus, order and class. Two new categories were added very early: the family and the phylum. The number of categories now in use is large indeed: species are

[246] Since the word " genus " in ontological discourse does not name a nature common to two or more species, there is no danger of confusing the ontological with the scientific meaning of " genus " as a more generic Race including less generic Races, i. e., species, as species in turn include races.

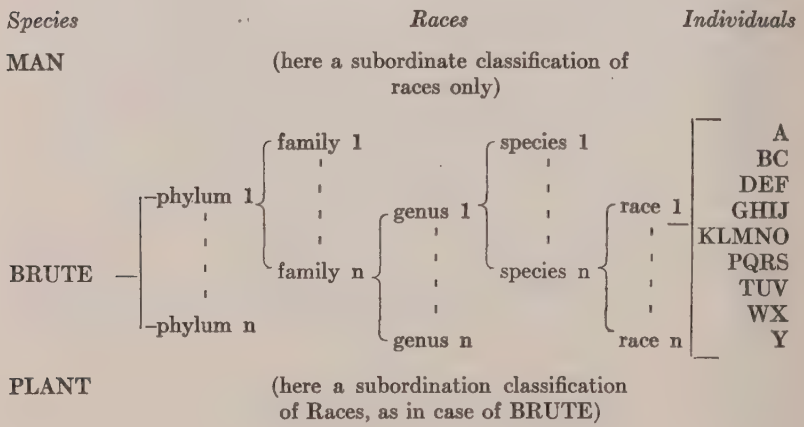
subdivided into subspecies and races of various rank, genera split into subgenera and sections, and grouped into tribes, subfamilies, families, superfamilies, suborders, etc." (*ibid.*, pp. 303-6).

Now it should be apparent at once that the scientific hierarchy is not an ontological order, but a logical scheme of classification. Races, species, genera, families, etc., are not related to one another as lower and higher grades of being, but as less and more inclusive classes. To say that the scientific scheme is a logical hierarchy does not mean, however, that the classes thus arranged are not natural types. If it be remembered that all Races, of whatever systematic rank, are "accidental natures,"—concretions of substance and accident,—and that Species of accident, unlike Species of substance, can participate in common genera, which in turn participate in common genera, it will be understood why the ordering of accidental classes is spoken of as a logical hierarchy, to distinguish it from the ontological hierarchy of essential natures (Species).[247] In their ontological hierarchy, Species are discontinuous. But it appears that within any rank of the logical hierarchy of Races, the Races of subordinate rank are also discontinuous. Except for such observed discontinuities, the classification of plants and animals would be an utterly arbitrary imposition, having no scientific validity. Furthermore, within the lowest rank, which is usually called a race or variety, there are no subordinate discontinuities; the individuals thus subsumed vary continuously in the sort of statistical array which a normal distribution represents. This means that there are two sorts of sub-specific variation: the continuous variation of individual differences within their respective races; and the discontinuous variation of races within species, species within genera, and so forth. We are told, moreover, that as we go higher in the systematic ranks, the discontinuities become more marked: racial differences more closely approximate the continuity of individual differences than specific differences do, and similarly in the case of species and genera; whereas at the upper end, families more closely approximate the absolute discontinuity which is found among Species, and phyla even more so.

Thus it appears that we not only have two meanings of "hierarchy," but two meanings of "discontinuity." The fact that the discontinuity of Species, which is absolute, involves gradations in

[247] The two hierarchies, here called "ontological" and "logical," could also be called "substantial" and "accidental." Thus, the system of scientific classification of Races is not only a logical hierarchy but a hierarchy of accidental classes; whereas the order of Species is an ontological hierarchy and a hierarchy of substances, essentially distinct.

being, suggests that the relative discontinuity, more and less marked, among Races of higher and lower systematic rank, may also involve gradations in being, though of an accidental sort. One Race may be more or less perfect than another as an accidental embodiment of its Species, the two Races thus compared being always of the same rank, i. e., two species, two genera, two families, etc. In order to avoid using the word " hierarchy " in still another sense, let us call this ordering of Races as lower and higher a " progression." Then we can say that there are ontological progressions at various levels of the logical hierarchy of Races, as there is an ontological hierarchy of Species. The latter stands to the former as a gradation of substantial perfections to gradations of accidental perfection. Some difficulties arise, however, when we remember two things: first, that it has been traditionally supposed that the sub-specific progressions are continuous in contrast to the absolute discontinuity of Species in their hierarchical disposition; second, that the continuous variation of individuals with respect to all accidental traits has been used to show that these traits do not signify Specific properties. We must explain, in short, why the discontinuities which prevail among Races do not force us to acknowledge the discontinuous types as Species; we must explain the difference between Racial variation and Specific discontinuity, on the one hand, and between Racial discontinuity and individual variation, on the other. Before we take steps towards these explanations, it will be useful to summarize the foregoing distinctions in a diagram:



NOTE

The order of Species in the vertical dimension is an ontological (or substantial) hierarchy. The order of Races in the horizontal dimension is a logical (or accidental) hierarchy, a hierarchy of accidental classes. The several orders of phyla, families, genera, etc., in the vertical dimension may or may not be ontological progressions. The order of individuals is a continuous normal distribution of individuals within a race. For convenience, only five of the systematic categories have been employed in setting up the hierarchy of Races; and in each case only one term in each rank has been further subdivided. The most complete and complicated diagram would not differ in any essential point from the simple one above constructed.

Much insight can be gained from comparing the distinction between Species and Race with that between species and race. Individual is a constant term for both pairs; and the other sub-specific terms will be illuminated by what is said about species and race. The first of these distinctions is made by the philosopher; the second is a problem for the scientist.

The philosopher tells us the Racial nature is a mean between the Specific and the Individual natures: like the Individual nature, the Racial nature is constituted by accidental determinations; but like the Specific nature, the Racial nature is common to many individuals. Whether it is common to many individuals in the same way as a Specific nature remains to be seen. In any case, the distinction between Species and Race is as absolute as that between essence and accident; not only absolute, but static in the sense that in the course of generations a Race never becomes a Species. The distinction between Race and Individual is not so well-defined, since both are constituted by accidental determinations, added to the Specific nature; both are the work of signate matter in generation. Perhaps, the distinction lies in the type of accident: Racial accidents must be the sort of contingent accidents we have called inseparable,—present in every individual born a member of that Race; whereas individual accidents may be separable as well as inseparable, the separable ones being acquired during the lifetime of the individual as a result of its agency or patiency in operation. The fact that some individual accidents are inseparable indicates that the line between racial and individual nature must remain vague, because both are somehow due to the accidents of birth. Perhaps, the line between them can be drawn in terms of accidental progression, Races being ordered as less and more perfect whereas individuals are of the same grade. But this too is doubtful because it is not clear that all Races differ in accidental

perfection, nor is it clear that one individual may not be a more perfect embodiment of the Specific nature, or even the Racial nature, than another. All of these doubtful matters about the status of Race as a mean between Species and individual may be illumined by what the scientist contributes, for he treats Race not as a simple mean, but as a complex hierarchy of classes, extending from race, at the level proximate to individuals, to phylum, at the level proximate to Species.

One thing, however, is philosophically clear. The existence of Races, like that of individuals, is required by the contingency and indetermination of all material forms. They are not determined *ad unum*. If they were they could exist independently of matter and would not be subject to further accidental determinations of all sorts. The accidental determinability of the substantial forms received in matter is the source of a potential infinity of individuals and Races, an infinity which expresses the scope of matter's potentiality for such determination. On this point, DeKoninck writes:

> There cannot be an idea of material form distinct and independent of the idea of the composite; even the separable human form implies a relation to matter. And the matter which enters into this idea is not determined without signifying also determinability with relation to an infinity of other forms. A form non-subsistent is not a quiddity in the strict sense. This is to say that the different sub-species, such as the 'species' of dog and that of elephant, cannot be absolutely opposed as the species-individuals which are pure spirits; it is to say, too, that their definition comprehends the notion of matter, i.e., the possibility of an infinity of other sub-specific forms which can be extracts of matter. . . . Hence, the existing varieties (sub-species) are analogues of the cross-sections made in a continuum which are determinately true only *a posteriori*. . . . The higher one goes in the hierarchy of Species, the more the forms become necessary and consequently intelligible" (*Le Problème de L'Indéterminisme*, pp. 125-8).[248]

Rousselot argues similarly: the indeterminability of terrestrial

[248] The last statement here explains why "man alone, of all cosmic species, does not admit of sub-species, precisely because his form is spiritual. . . . Nevertheless, even here, the determination attains only the species, and not the multitude of extremely variated individuals in which is counterbalanced the defect of determination that is due to matter" (DeKoninck, "Réflexions sur le Problème de l'Indetérminisme," *Revue Thomiste*, XLIII, 2, p. 236). The statement that there are no sub-Species of *man* is not quite accurate, if sub-Species are any rank of Race; for there are races of *man*, although there are no higher ranks, such as species, genera, etc. That there are only races of *man*, and the way in which these races are related, sufficiently make the point of difference between *man* and inferior Species.

essences " makes it impossible to conceive the simultaneous actuation of all possible determinations in one particular subject or even their successive actuation." [249] The potentiality of material forms, which is relative to matter, requires the multiplication and diversity of individuals and Races. Two passages from St. Thomas can be relevantly cited:

> Every individual in the case of natural things as we know them here below is imperfect since no one of them is capable of exhausting all the attributes of the species " (*In De Caelo,* I, 19).
>
> Where inferior things are concerned we see that the same nature comprises several individuals. The reason for this is . . . the incapacity of any individual to show forth all the perfection that is contained in the nature as a principle of activity " (*In De Caelo,* II, 16).

Furthermore, the Racial nature is relatively more intelligible than the individual nature, though less intelligible than the Species.[250] But to understand the Racial connection of individuals we must perceive, as Rousselot suggests, " the rhythms within the species "; we must trace " all the determinations of the essence through its many types which represent and limit it at one and the same time." [251] We are not capable of such knowledge, however, except remotely and inadequately, and such as it is we owe to the work of scientific research.[252] Let us consider, therefore, the relevant contribution of science.

[249] *The Intellectualism of St. Thomas,* pp. 129-30.

[250] When matter " unites with the form to constitute an individual it is not confined to the mere production of an individual (an *aliquid*) in the sense of an *ens ratum in natura,* but an individual in the sense of a *hoc aliquid,* which within the limits of the species differs by certain qualities from another example of the same nature (*illud*) as a consequence, and in virtue of matter itself . . . an element has entered the world which is accessible to our minds. . . . It follows that the comparison of the *hocs* and *illuds* within the domain of the same species is not something which is totally incapable of contributing to the perfection " of human knowledge (Rousselot, *op. cit.,* p. 128).

[251] *Op. cit.,* p. 131. Writing *as if* ox were a Species, Rousselot exemplifies his point by saying that if we had such knowledge, then in our idea of an ox " would be arranged the big and the little, the white and the black, the red and all intermediate and mixed, and similarly for all other possible qualities." This statement applies even more extensively to the idea of *brute* as a Species, subsuming more than a hundred thousand Racial differences.

[252] If we did possess " such humanly perfect knowledge, we should resemble the least of the angels who perceive the individuals in their species (*specialissime*). But it is important to note that even then an immeasurable distance would separate our knowledge from that of the angel. The sensible origin of all this knowledge of ours would prevent its being anything other than a patchwork of corresponding pieces, and as a consequence a system of abstractions, not of intuitions " (Rousselot, *op. cit.,* p. 131).

The scientist asks us, first of all, to distinguish between the individual traits according as they are genotypical or phenotypical. " The genetic constitution of an individual, its genotype, determines its reaction to the environment; the appearance or phenotype is the resultant of the interaction between the genotype and the environment." [253] In other words, what we have called inseparable accidents are always genotypical, whereas the separable ones are phenotypical. But, as we have seen, inseparable accidents can be part of the individual character as well as of the Racial type. The distinction between Racial and individual character must, therefore, be made in other terms. The only distinction which can be made regards the Racial character as due to the collective genotype of a large number of individuals. Racial nature, strictly, is possessed by a population, not by an individual. That is what is meant by saying that a race is a statistical array of individuals, normally distributed around the modal point of the traits caused by the collective genotype. Not all the individuals included have the same genetic constitution; they differ genotypically from one another; but all the individuals of one race differ from those of another by participating more or less in the pattern of the collective genotype which constitutes the race, more or less as they approach or recede from the norm of the distribution.[254]

To understand the scientist's conception of Races, we must note that he is primarily concerned with the two lowest ranks of the sub-Specific hierarchy, namely, species and races. The main problem for him is the one originally mentioned: how to distinguish between race and species. Darwin's greatest insight is on this very point. He saw that races and species are not static entities, capable of well-defined distinction, but rather dynamic stages in the process of sub-Specific variation through countless generations. Using the word " variety " for " race," he repeatedly tells us in the *Origin of Species* that

[253] T. Dobzhansky, *op. cit.*, p. 15.

[254] Vd. Dobzhansky, *op. cit.*, pp. 11, 39-41, 47-48, 60-63. The view of Racial character as belonging, strictly, to populations, not individuals, has obvious philosophical significance. A Specific nature belongs equally to every individual member of the Species. But since the Racial nature is only a norm, or more precisely a normal distribution, it can belong, as such, to no single individual, though individuals may approximate more or less to the embodiment of the normal type. To say that a Racial nature is a populational and statistical affair does not mean that it is something arbitrarily imposed upon individuals by scientific classification; it is not a scientific fiction. It is as natural as Specific or individual nature,—something objectively real to be discovered by the mind,—even though its mode of being and of inherence in the individual subject is different. Cf. Dobzhansky, *op. cit.*, Ch. X.

Certainly no clear line of demarcation has as yet been drawn between species and sub-species,—that is, the forms which in the opinion of some naturalists come very near to, but do not quite arrive at, the rank of species; or, again, between sub-species and well-marked varieties, or between lesser varieties and individual differences. These differences blend into each other by an insensible series. . . . I look at varieties which are in any degree more distinct and permanent, as steps towards more strongly marked and permanent varieties, and at the latter, as leading to sub-species, and then to species. . . . A well-marked variety may therefore be called an incipient species (*Op. cit.*, Everyman edition, from the plates of the sixth edition; p. 59).

The amount of difference is one very important factor in settling whether two forms should be ranked as species or varieties. . . . In large genera the amount of difference between the species is often exceedingly small. . . . In this respect, therefore, the species of the larger genera resemble varieties more than do the species of the smaller genera. . . . Moreover, the species of the larger genera are related to each other in the same manner as the varieties of any one species are related to one another (*ibid.*, p. 63).

That many breeds produced by man have to a large extent the character of natural species is shown by the inextricable doubts whether many of them are varieties or aboriginally distinct species. . . . No one has drawn any clear distinction between individual differences and slight varieties; or between more plainly marked varieties and sub-species or species. . . . On the view that species are only strongly marked and permanent varieties, and that each species first existed as a variety, we can see why it is that no line of demarcation can be drawn between species, commonly supposed to have been produced by special acts of creation, and varieties which are acknowledged to have been produced by secondary laws. . . . Hereafter we shall be compelled to acknowledge that the only distinction between species and well-marked varieties is, that the latter are known, or believed, to be connected at the present day by intermediate gradations, whereas species were formerly thus connected. . . . It is quite possible that forms now generally acknowledged to be merely varieties may hereafter be thought worthy of specific names (*ibid.*, pp. 444-460).

Darwin's insight has been confirmed by all the researches since his day, especially those of the geneticist; although much has been learned to complete and correct Darwin's account of the various factors and forces operative in the mutability of Races.[255] Questions

[255] In a recent article, *The Origins of Species*, Professor Julian Huxley writes: "If Darwin were alive today, the title of his book would have to be not the 'Origin,' but the 'Origins of Species.' For perhaps the most salient single fact that has emerged from recent studies is that species may arise in a number of quite distinct ways" (*The Virginia Quarterly Review*, XVI, 1, p. 14). And he goes on later to say: "Subspecies have often been stated to be species in the making. Undoubtedly many of them are. But, equally undoubtedly, many of them are not. Many widespread species are permanently divided into a number of these partially

of aetiology can be ignored for the moment; strictly they belong to the problem of generation. We are concerned only to note that the most recent scientific report reiterates that races are a dynamic stage in the becoming of species. Thus:

The term 'race' is used quite loosely to designate any subdivision of a species which consists of individuals having common hereditary traits. . . . The momentous problem is whether the genetic basis of this racial variability is the same as that of the individual one. . . . The individual variability, in so far as it is hereditary, may be likened to a store of building materials; the process of race formation consists in arranging the materials in definite patterns. . . . Race formation begins with the frequency with which a certain gene or genes becomes slightly different in one part of a population from what it is in other parts. If the differentiation is allowed to proceed unimpeded, most or all of the individuals of one race may come to possess certain genes which those of the other race do not. Finally, mechanisms preventing the interbreeding of races may develop, splitting what used to be a single collective genotype into two or more separate ones. When such mechanisms have developed and the prevention of interbreeding is more or less complete, we are dealing with separate species. A race becomes more and more of a 'concrete entity' as this process goes on; what is essential about races is not their state of being, but that of becoming. But when the separation of races is complete, we are dealing with races no longer, for what have emerged are separate species" (Dobzhansky, *op. cit.*, pp. 47-63).

In the pre-Darwinian days the relative ease of separating species, and the greater difficulty of combining them into higher categories or subdividing them into lower ones, seemed to offer no great difficulties for explanation. . . . The situation has changed completely in the light of the evolutionary theories, for now such concepts as race, species, genus, family, etc. have come to be understood as connoting nothing more than degrees of separation in the process of gradual phylogenetic divergence. . . . The present writer (defines) species as that stage of evolutionary process at which the once actually or potentially interbreeding array of forms becomes segregated into two or more separate arrays which are physiologically incapable of interbreeding. This definition of species . . . lays emphasis on

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isolated subspecies, still exchanging a few genes with each other by interbreeding, but each relatively stable on the whole. . . . It appears that there are two positions of relatively stable equilibrium in the process of evolutionary divergence. There is the stage of species or of complete biological discontinuity, and there is the stage of interbreeding subspecies or of partial biological discontinuity" (*ibid.*, p. 21). By "subspecies" Professor Huxley means *races* or *varieties*, which subdivide the systematic rank called "species."

For the background of *The Origin of Species*, showing how early Darwin came to his basic insight about the development of species through accidental variation, vd. *The Foundation of The Origin of Species*, consisting of two essays written by him in 1842 and 1844, and later edited by his son Francis Darwin (Cambridge, 1909).

the dynamic nature of the species concept. Species is a stage in a process, not a static unit" (*ibid.*, pp. 309-312).[256]

We have learned two things from the scientist so far: (1) the distinction between individual and Racial character; and (2) the distinction between race and species. In both cases the distinctions are dynamic and relative ones, to be understood as degrees of variability and stability in the process of generation. Genotypical individual differences can become racial characteristics if their genetic conditions occur with a certain frequency and diffusion in an interbreeding population; racial differences can become specific if their genetic conditions are isolated by the various factors which prevent interbreeding between two racial populations. The accidents of breeding, with the genetic consequences of the resulting breeding situation, draw the line between race and species. This does not mean that species are more natural groupings than races are, but simply that they are genetically more stable and more differentiated. Hence what is true of races is somewhat less true of species, namely, that the typical characteristics belong to a normally distributed population rather than to all the individuals of the type, in the same way and equally. What is here said of species in comparison with race, can be repeated of genus in comparison with species, family in comparison with genus, and so on up the ranks of the systematic hierarchy. Each more general rank comprises types which are genetically more stable, which are more differentiated *inter se*, and their typical characteristics tend more definitely to belong to all the individuals thus typified, in an equal and similar manner. But it is also true that just as races and species are dynamic affairs,—stages in the process of differentiation,—so, too, are genera, families, and so on. As races become species, so in turn species become genera, through including species under them where before they included races.[257] There is some

[256] Dobzhansky recognizes the difficulties which cannot be eliminated from the task of classification because "instances where groups of forms are caught at our time level in the transition stage between race and species" are a hindrance to the systematist. It should also be observed that Dobzhansky restricts himself at this point to sexually reproducing organisms; the problems are different and more difficult in the case of asexual organisms. Vd. *op. cit.*, pp. 316-321. Cf. Julian Huxley, *op. cit.*

[257] "Two or more genera are produced by descent with modification, from two or more species of the same genus. And the two or more parent species are descended from some one species of an earlier genus. . . . I see no reason to limit the process of modification to the formation of genera alone. Two groups of genera will form two distinct families, or orders, according to the amount of divergent

reason, however, for regarding the transition from race to species as an objective change in natural circumstances, whereas the transition from species to genera, genera to families, is more a subjective matter of our scheme of classifications.[258] That is why the distinction between race and species is more important than the others, and why species are regarded by scientists as the " most natural " of all the types they classify.

We are now prepared to return to the fundamental question about continuity. Since all the accidental differences which separate racial groups, and hence specific types that arise from the isolation of these groups, have their ultimate source in the genetic variation of individuals; and since individuals in any given group vary continuously from one another by degrees of the same differences, the discontinuities in Racial variation, which underlie the distinction of classes at each Racial rank, must be nothing more than accidental results of the evolutionary process. In other words, all the discontinuities which are found in sub-Specific variation are relative to a basic continuity which must be ideally posited and can be historically reconstructed. This is what we should expect on philosophical grounds, because of the very nature of accidental differences: things which differ accidentally must vary continuously. Absolute discontinuity pertains only to Specific or essential differences. Hence, to recognize that the discontinuity between Races, of whatever rank, is only relative, is to perceive the underlying continuity which, at any given time level in the process of evolution, is only approximated. And this is precisely what science teaches. Darwin explains the gaps among living things at the present time by the extinction of the intermediate forms and transitional varieties. If it were not for the great imperfection of the geological record, we could reconstruct the extinct forms, and by placing them properly amidst living types we could arrange living things in a line of continuous variations. Ideally, only individual differences would appear; but, at least, the only sub-Specific groupings would be racial ones.[259]

modification. . . . And the two new families are descended from two species of the original genus " (Darwin, *op. cit.*, pp. 114-5).

[258] Vd. Dobzhansky, *op. cit.*, p. 306.

[259] In the chapter devoted to the difficulties of his own theory, Darwin asks: " Why, if species have descended from other species by fine gradations, do we not see innumerable transitional forms? Why is not all nature in confusion, instead of the species being, as we see them, well defined? " (*Op. cit.*, p. 156). A perfect continuity in nature would mean " confusion " instead of distinction of groups. " The main cause of innumerable intermediate links not now occurring everywhere throughout nature, depends on the very process of natural selection, through which new varieties continually take the places of and supplant their parent-forms.

Darwin's explanation was largely historical; but its insight is confirmed and deepened by the contemporary geneticist's approach to the same problem. Thus, Dobzhansky writes:

> The theory of evolution asserts that the beings now living have descended from different beings which have lived in the past; that the discontinuous variation observed at our time level, the gaps now existing between clusters of forms, have arisen gradually, so that if we could assemble all the individuals which have ever inhabited the earth, a fairly continuous array of forms would emerge. . . . Races and species as discrete arrays of individuals may exist only so long as the genetic structures of their populations are preserved distinct by some mechanisms which prevent interbreeding (*Op. cit.*, pp. 7-13).
>
> Before proceeding further with our discussion of species as natural units, it may be useful to make a short digression to consider certain prolegomena on which this discussion is based. Let us examine first an imaginary situation, a living world in which all possible gene combinations are represented by equal numbers of individuals. Under such conditions no discrete groups of forms and no hierarchy of groups could occur. . . . The variability would become a perfect continuum. The most 'natural,' although not the only possible, classification would be a sort of multi-dimensional periodic system, with a number of dimensions equal to that of the variable genes. Clearly, the existing organic world is unlike the above imaginary one. . . . Each race, species, genus, or any other group, embraces a certain array of gene combinations attached to an 'adaptive peak,' or to several neighboring peaks. The fact that one group may be distinguished from the related ones necessarily implies that the gene combinations lying in the field between the peaks are formed only rarely or not at all. Now, if the representatives of the different groups interbred at random, all the gene combinations that are now rare or absent, would be produced, given a sufficient number of individuals, within a few generations from the start of random breeding. That would mean a breakdown of the separation of groups, and an emergence of a continuous variation over a part of the field. If all the organisms were to interbreed freely, a perfect continuum postulated above would result. The conclusion that is inexorably forced on us is that the discontinuous variation encountered in nature, except that based on single gene differences, is maintained by means of preventing the random interbreeding of the representatives of the now distinct groups. This conclusion is evidently applicable to discrete groups of any rank whatsoever, beginning with minor races of a species and up to and including classes and phyla (*ibid.*, pp. 307-8).[260]

But just in proportion as this process of extermination has acted on an enormous scale, so must the number of intermediate varieties, which have formerly existed, be truly enormous" (*ibid.*, p. 292). Cf. *ibid.*, pp. 303-345, 440-443.

[260] Cf. *ibid.*, Ch. V and VIII. This discussion of the natural continuum and the discontinuity of single mutations requires a deeper interpretation of the maxim which Darwin so frequently repeats: *Natura non facit saltum.* Vd. *What Man*

The apparent discontinuities among individuals of the same Species, which locate them in different Racial groups, are the result of historic processes of selection and extermination, and genetic factors of interbreeding and isolation. The discontinuous groups are like separated, visible areas in a continuous spectrum. In each Species, the infinity of possible sub-Specific forms, would be disposed in a continuum, if they all co-existed. That they do not all co-exist is the cause of the existing discontinuities; as DeKoninck remarks, the existing varieties are like so many cross-sections made in a continuum. Furthermore, because of the diverse ways in which individuals of the same Species differ accidentally from one another, there would not be one such continuum, but many. Dobzhansky's point about the use of a multi-dimensional periodic system to arrange the members of the natural continuum is another way of saying that the continuity of things differing accidentally is multilinear.[261] Moreover, this multilinear continuum would be ultimately an arrangement of things according to their individual differences, to the character of the individual substance (rather than that of race, species, genus, etc.) as the most determinate embodiment of the Specific nature. Only individual differences which expressed genetic constitution would be significant, of course, since we are concerned with what is added to substantial form by the signate matter operative in generation. In proportion as the continuum is interrupted by invisible areas, because of the non-existence of possible individual variants, do racial and specific characteristics become significant as revealing the ways in which the Specific nature can become accidentally determinate in existence.

One other fundamental question remains. Are there ontological progressions from lower to higher grades of accidental perfection in the natural continuum, either in its ideal state or under actually existing conditions of relative discontinuity? Theoretically, the answer must be affirmative, because of all possible accidental determinations, some will accord better and some worse with the realizable potentialities of the Specific nature. But since the ideal continuum is multilinear, it is also possible for three situations to occur: (1) one individual may be wholly superior or wholly inferior to another; (2) an individual may be superior in some respects, and inferior in others; (3) individuals may be coordinate in the degree of accidental perfection with which they embody the Species. It

Has Made of Man, Note 31, which must be corrected in terms of the distinction between Species and sub-Species. There is continuity with respect to the latter, a continuity which is compatible with mutation jumps.

[261] Vd. Part III, Section 15, *supra*.

should be noted at once that just as the *absolute discontinuity* of essential natures contrasts with the *absolute continuity* (or, existentially, the *relative* discontinuity) of accidentally determined natures, so the *hierarchy* of Species, in which every member must be unqualifiedly higher *or* lower in grade of being, contrasts with the *progression* of individuals (or, existentially, of Races), in which members may either be coordinate, or *both* higher *and* lower in respect to different accidental perfections.

The question can also be answered in the light of facts about the world of existent things. Within each of the Specific domains (i.e., *plant* and *brute animal*), there is evidence of progression from lower to higher only in upper ranks of the systematic hierarchy, i.e., among phyla or even more extensive and less determinate accidental classes. The races of a species, the species of a genus, or even the genera of a family, cannot be ordered progressively. Some may be more adaptive to a particular environment, and some less, but degree of adaptation to the contingent circumstances of a changing environment is not the true measure of ontological perfection.[262] Rather it is the degree of complexity in the scale of organization of organic structures and functions, particularly the development of special structures for specialized functions. By this standard, races, species, genera, and even families, differ *inter se* within their proximately inclusive class, in accidental traits which may or may not be adaptive, but which do not signify a superior mode of life. In short, coordination is the general rule, coordination which usually manifests itself in the possession, by a given type, of traits lacked by another, accompanied by the privation of traits possessed by that other. Thus, for instance, among animals which

[262] We are not concerned here with the selection of the fittest in the struggle for existence, although the operation of selective factors may have resulted in the preservation and development of Racial types which tend, in the long run, to mutate in the direction of superior accidental embodiments of the Species. Thus Darwin writes: "As species have generally diverged in character during their long course of descent and modification, we can understand why it is that the more ancient forms, or early progenitors of each group, so often occupy a position in some degree intermediate between existing groups. Recent forms are generally looked upon as being, on the whole, higher in the scale of organization than ancient forms; and they must be higher, in so far as the later and more improved forms have conquered the older and less improved forms in the struggle for life; they have also generally had their organs more specialized for different functions. This fact is perfectly compatible with numerous beings still retaining simple and but little improved structures, fitted for simple conditions of life; it is likewise compatible with some forms having retrograded in organization, by having become at each stage of descent better fitted for new and degraded habits of life" (*Op. cit.*, p. 451).

have the power of locomotion, it is difficult, if not impossible, to say that walking is superior to flying or flying to swimming, since each is a specialization of the locomotive function appropriate to a particular medium. Similarly, in the case of the specialized development of this or that exterior sense-organ, there is no ground for regarding one kind of animal as accidentally more perfect than another.[263] The only way we can make the *probable* judgment that one type of animal, or plant, is superior to another is in terms of complexity of organization, the possession of a greater variety of parts and a larger number of more specialized functions. Employing this criterion we find that there is evidence of ontological progression only among relatively indeterminate types, such as the phyla, or even more extensive and less determinate Racial groups.[264]

"There is a greater variety of parts in perfect than in imperfect animals; and in these a greater variety than in plants," says St. Thomas.[265] In these terms we can understand the meaning of the statement that "the higher nature in its lowest degree touches the

[263] Vd. St. Thomas's discussion of these matters, *Summa Theologica*, I, 71, 1; 72, 1. It is interesting to observe that in particular respects, various types of animals are superior to man, e. g., in speed of locomotion, in capacity to move in certain media, in the acuity of this or that sense, in the possession of organs of defense or attack, or organs of productive operation. Instead of these, however, man "has reason and hands, whereby he can make himself arms and clothes, and other necessaries of life, of infinite variety. Wherefore, the hand is called by Aristotle (*De Anima*, III, 8), the organ of organs. Moreover this was more becoming to the rational nature, which is capable of conceiving an infinite number of things, so as to make for himself an infinite number of instruments" (*Summa Theologica*, I, 91, 3, ad 2). Cf. *ibid.*, ad 1; also 76, 5, ad 4.

[264] "Long-range evolution, guided by selection, produces divergent specialization of types over tens of millions of years; the placental animals, for instance, gradually radiated out into carnivores and insectivores, bats and ungulates, rodents, cetaceans and primates. It leads to the widespread extinction of older types and their replacement by new types which radiate and specialize in their turn. It leads, in a few and ever lessening number of lines, to true evolutionary progress. . . . The result is that life finds its expression in the form of almost innumerable separate groups, some fully separate, like good species, some on the way to full separation, like geographically isolated subspecies, some at the half-way equilibrium point of partial separation, like continental subspecies still interbreeding at their margins. . . . Evolution in the broad sense consists of a few kinds of long-range trends. But these are cut up by isolation into species and subspecies, whose enormous numbers bear no relation to the major underlying trends. And even the adaptive nature of these small units is largely obscured by the frills and furbelows of non-adaptive accident which can lodge in these discontinuous group-units—mere diversification abundantly but meaninglessly superposed on the adaptive meaning and slow advance of life" (Julian Huxley, *loc. cit.*, pp. 22-3).

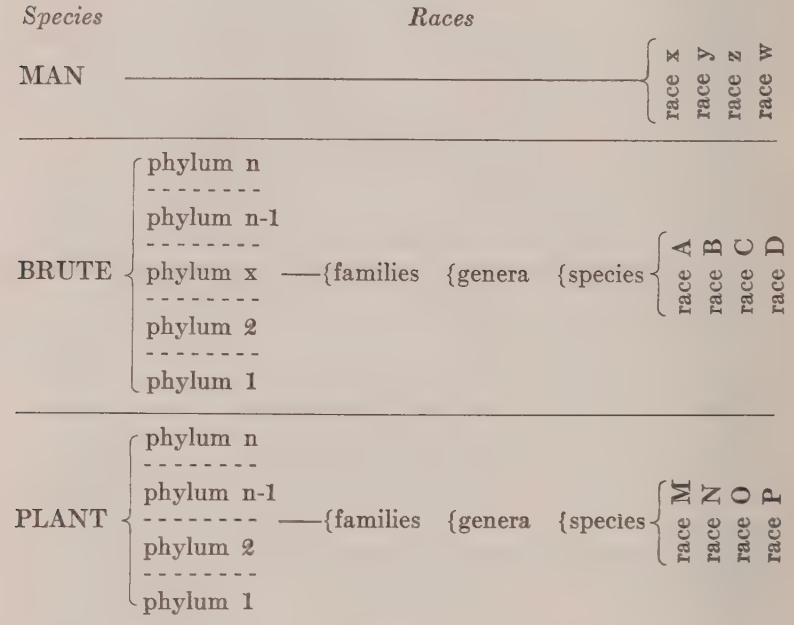
[265] *Summa Theologica*, I, 76, 5, ad 3.

lower nature in its highest degree." [266] Strictly, the word " touches " is false, for the fundamental fact is the discontinuity of Species; but there is, at least, a metaphorical truth conveyed by the word " touches: " the absolute discontinuity of Species is made less sharp by the fact that within Species, there are progressions from lower to higher accidental types, such that higher plants and lower animals have more in common *accidentally* than lower plants and higher animals. This gives the *appearance* of continuity, but it is only an appearance, because in proportion as accidental types are more capable of progressive ordering, they are also more discontinuous in their range of variation. The following diagram exhibits the relation of the hierarchy of Species and the progression of Races. This diagram summarizes the facts about the ontological hierarchy and progression, the discontinuity and continuity in variation, of animate substances.

This summary can also be formulated in a series of propositions, which report our philosophical knowledge about Races in relation to Species and Individuals. (1) Of all the accidental classes, races as most proximate to individual natures are most fully real, because most fully determinate. (2) In proportion as an accidental class is more fully determinate, it tends to be related by more continuous variation with other classes of the same rank. (3) In proportion as an accidental class is less continuous in variation with other classes of the same rank, it tends to be more capable of progressive ordering as higher or lower than other classes of the same

[266] *Summa Contra Gentiles,* II, 91. Aristotle's statement is similar: " Nature proceeds little by little from things lifeless to animal life. . . . Of plants, one will differ from another as to its amount of apparent vitality. . . . Indeed, there is observed in plants, a continuous scale of ascent towards the animal. . . . And so throughout the animal scale there is a graduated differentiation in amount of vitality and in capacity for motion " (*Historia Animalium,* VIII, 1, $588^{b}4$-22). Cf. Locke, *Essay Concerning Human Understanding,* III, 6, 12: " There are some brutes, that seem to have as much knowledge and reason, as some that are called men; and the animal and vegetable kingdoms are so nearly joined that if you will take the lowest of one, and the highest of the other, there will scarcely be perceived any great difference between them; and so on till we come to the lowest and the most inorganical parts of matter, we shall find everywhere that the several species are linked together, and differ in almost insensible degrees." Vd. also Whitehead's remarks on the continuity among living things: " It is to be noticed that the personality of an animal organism may be more or less; it is not a mere question of having a soul or not having a soul; the question is, How much soul, if any? (*Adventures in Ideas,* New York, 1933: pp. 266-7). But both Locke and Whitehead deny substantial form, and hence cannot grasp the distinction between essential and accidental difference: vd. Locke, *ibid.,* III, 6, 24; 3, 14; Whitehead, *Process and Reality,* New York, 1929: Pt. I, Ch. 2, 3; Pt. II, Ch. 1.

rank. (4) In proportion as an accidental class is less determinate, it is also less variable (more stable) in the course of generations,



NOTE

We are here using phyla as the most extensive and least determinate systematic class among the Races. We are comparing only the two extremes of Racial rank: the phyla, most proximate to Species, which manifest progression most and at the same time are most discontinuous as variable types; the races, most proximate to Individuals, which manifest coordination most and at the same time are most continuous as variable types. We have not diagrammed the ordering of the intermediate ranks (family, genus, species). The unbroken horizontal lines signify the absolute discontinuity of brute *and* plant, man *and* brute, *as Species. The broken lines indicate the relative discontinuity of the phyla as higher and lower accidental types. The absence of lines indicates the relative continuity of the coordinate races.*

e. g., generic traits are less variable than specific.[267] In short, continuity in variation, degree of variability, tendency to coordination

[267] As bearing on these four propositions, vd. Darwin, *op. cit.*, pp. 144-147, 449; Dobzhansky, *op. cit.*, Ch. I, X.

as opposed to progression, are correlated proportionally with Racial rank according to the amount of accidental determination which the classes of a given rank add to the Specific nature: the more like the completely determinate individual nature the Racial type is, the more its relation to other types of the same rank resembles the relation of individuals; the more like the Specific nature, the Racial type is with respect to lack of accidental determinations, the more its relation to other types of the same rank resembles the relation of Species. The ontological progression, the relative discontinuity and stability of phyla, for example, present an accidental image of the hierarchical ordering of Species. In strictest principle, however, all the accidental types should be thought of primarily in their degree of proximity to the individual nature, because they all differ from the Species as individuals do, by the addition of accidental determinations. They are all the work of signate matter in generation. That is why the racial embodiments of the Species are, next to its individual embodiments, the most fully real, the most adequately representative of the material factor in the existence and becoming of composite substances. That is also why instability (mutability), continuity in variation, and coordination rather than progression, are more essentially typical of the Racial nature than their opposites.

There is a famous text, often cited by both St. Augustine and St. Thomas, which completes our discussion of the order of nature. God has ordered all things in measure and number and weight (*Wisdom,* 11: 21). "Measure fixes the mode of everything, number gives it its species, and weight gives it rest and stability."[268] Measure determines the mode of being which is antecedent to Species, such as the incorporeal and corporeal, or the living and the inanimate; weight consists of all the accidental determinations which are consequent to Species, and these may be Racial or Individual.[269] The difficult question is whether God has ordered all things hierarchically and in every way. Certainly, according to measure and number (mode and species), each creature is higher or lower than another. In the realm of spiritual creatures where each is a species-individual, the weight of each angel,—its spiritual gravity,—is unequal to the weight of every other. Each angel has its proper place of rest and stability. But in the world of physical things, it appears to be the case that all individuals of the same

[268] St. Augustine, *Gen. ad lit.,* IV, 3. Cf. St. Thomas, *Summa Theologica,* I, 5, 5; I-II, 85, 4; and *QQ. Disp. de Veritate,* 21, 6.

[269] Cf. Cajetan, *In Summa Theologica,* I, 5, 5.

Species move toward the same" place " as the term of their motions, although they may approximate it unequally according to the fortunes of their contingent careers. If we consider them apart from their operations, individual physical things appear to have differences in weight only in so far as they differ Racially. They are ordered hierarchically with respect to their accidental character only in its most general determinations (i. e., such as the accidents pertaining to the differentiation of phyla). Individuals of the same Species and of the same race are unordered, in the sense of being coordinate. In this last respect, man differs from other composite substances. Because it is created as an individual, and is not a by-product of generation, each human soul has its own degree of spiritual gravity and a unique place as the goal of its destiny. Equal in their common Specific nature, men are unequal as individuals.

(b) There is no problem about evolution, in the usual sense in which that is spoken of as if it were a single problem, involving the theologian, the philosopher, and the scientist in destructive conflict. One of the most illuminating consequences of the resolution of the problem of species, in terms of the first position, is its clarification of the endlessly muddled discussion of evolution. The clarification is achieved by separating the questions according as they belong to science, on the one hand, or to theology, on the other, and by defining the separated questions in terms proper to the universe of discourse in which they belong. The philosopher, as we shall see, has problems in connection with both domains.

The chief scientific question is not about the *origin* of Species, but the *mutability* of Races.[270] To the general question, are Races mutable? the facts give an indisputable and overwhelming affirmative answer. We have already indicated, in the foregoing discussion of Races, the meaning of Racial mutability and the character of the relevant scientific evidence. The problems of evolution which remain for the scientist to solve call for an exact description of the process and a formulation of its various factors. It looks as if the great work of the future would be done by the experimental geneticist. In the past the fact of evolution, i. e., the fact of Racial mutability, and the genealogical connection of all sub-Specific types, was the work of the field naturalist, the taxonomist, supported by evidences from comparative anatomy, paleontology, the breeding

[270] Of course, the scientist talks about the mutability of " species," because that sub-Specific rank focusses the problem more than any other, but the problem is not one of origins in an absolute sense, beginnings *de novo*, but of development by descent with modification. Vd. Darwin, *op. cit.*, pp. 454 ff.

of domesticated varieties, etc. The historical problem remains, of course,—the problem of constructing precisely the developmental series which represents the steps of mutation by which presently existing types have come to be from types either now totally extinct or at best existing in a modified way. But there is little hope of solving this problem because of the irremediable obscurity and imperfection of the geological record. The descriptive problem, concerned with the formulation of the developmental process in a single observable segment, gives promise of experimental solution.[271] In either case, however, the word "evolution," as used by the scientist, means the production of the *unlike in nature*, during the course of generations and under the operation of entirely natural, or secondary, causes, of the same sort which operate in the production of like by like; furthermore, the "nature" being considered is always Racial, and never Specific.

If the scientific problems be thus understood, two things follow at once: first, the philosophical conception of Races as accidental concretions within the domain of a Species makes the scientific problems thoroughly intelligible in ontological terms; second, the philosopher of nature is led to consider the generation of the unlike as a deviation from the normal course of propagation in which like produces like, not only in Specific nature but also in Racial type. This is clearly a problem for the philosopher and not the scientist. It should be a major question in any thorough analysis of substantial change in the sphere of living things.[272]

With their problems thus separated, though related, by the distinction between Species and species, there can be no conflict between natural philosophy and natural science concerning "evolution." Unfortunately, there are such conflicts, and it is significant

[271] Vd. Dobzhansky, *op. cit.*, Ch. I. "Since evolution is a change in the genetic composition of populations, the mechanisms of evolution constitute problems of population genetics. . . . Experience seems to show that there is no way toward understanding the mechanisms of macro-evolutionary changes, which require time on a geological scale, other than through a full comprehension of the micro-evolutionary processes observable within the span of a human lifetime and often controlled by man's will" (pp. 11-12). This assumes, of course, that all the changes which have taken place now continue to be in operation and therefore can be studied experimentally (p. 7). How neglected, until fairly recently, were "studies of the mechanisms of evolution is apparent from the fact that in 1922 Bateson was able to write: 'In dim outline evolution is evident enough. But that particular and essential bit of the theory of evolution which is concerned with the origin and nature of species remains utterly mysterious'" (p. 8). Cf. T. H. Morgan, *Evolution and Genetics*, Princeton, 1925.

[272] These matters will be discussed in a subsequent article on the problem of generation.

that they arise from transgressions and errors either on the part of the philosopher or of the scientist. On the one hand, there are philosophers who treat Races, and more particularly species, as if they were Species, and hence are led to deny the sort of mutability which the scientist thinks his facts attest.[273] On the other hand, there are scientists who treat Species as if they were merely Races, though of the highest generic rank in the scheme of classification, and hence attribute to Species the sort of mutability which belongs to species. As a further consequence, they deny all essential differences, and regard everything as differing only in degree in the grand continuum of nature.[274] The scientist is unsupported by the facts in his denial of a hierarchy of essential grades; his exclusive emphasis upon continuity arises from an unwarranted extrapolation

[273] Gredt, Monaco, Phillips, and other "neo-scholastics" who think that there are many natural Species within the domains of *plant* and *brute,* cannot avoid either denying scientific evidence or evading its implications somehow; for Species are immutable, except in the sense in which the theologian can speak of one arising from another through the operation of supernatural or preternatural causes. Vd. Gredt's attack on Darwinism as an example of all the "false problems" which result from taking the position of the second theory about Species: *op. cit.,* #160, #608-612. Note also that Monaco's definition of "species" not only describes what the scientist regards as a species, but at the same time denies the very mutability which the scientist finds indispensable to his dynamic conception of species as a stage in the development of races into genera (vd. Part IV, Section 16, at end).

[274] A typical expression of this point of view is the dogma with which the biological scientist frequently indoctrinates the elementary student: that living and non-living things differ only accidentally, and similarly, plants, animals and men. "Although there is no difficulty in identifying a mammal or a tree as a living organism in contradistinction to the ground on which they are seen, the distinction becomes less clear as one approaches the line of division of the simplest forms of life from the more complicated non-living system. . . . Truly the concept of life breaks down at this level, and there is every reason to believe that all stages of transition from linseed oil which 'remembers' to micrococci may exist. . . . A man and a marigold do fundamentally the same things. The various organ systems which make the two so entirely different are merely different successful answers to the same problems" (*Syllabus for the Introductory General Course in the Biological Sciences,* Chicago, 1937: p. 5). Cf. the position of such modern philosophers as Locke and Whitehead (fn. 266, *supra*) and, of course, John Dewey, who writes as follows: "For the philosophic significance of the doctrine of evolution lies precisely in its emphasis upon the continuity of simpler and more complex organic forms. The development of organic forms begins with structures where the adjustment of environment and organism is obvious, and where anything which can be called mind is at a minimum. As activity becomes more complex, coordinating a greater number of factors in space and time, intelligence plays a more and more marked role, for it has a larger span of the future to forecast and plan for" (*Democracy and Education,* New York, 1916: Ch. XXV, pp. 392-3).

of the facts at his disposal. The philosopher is equally unsupported by principles or analysis in his denial of continuity and instability below the level of Species; he has in fact committed a worse error because he should know better; moreover, while confessing his dependence on the scientist for knowledge of distinctions below *plant* and *brute*, he transgresses the sphere of his competence,—violating the autonomy of science,—by deciding what scientific evidence he will accept or reject. The problems which result from such errors and transgressions are false and ungenuine; yet, for the most part, these are the matters discussed when philosophers and scientists engage in controversy about " evolution."

Entirely distinct from the genuine scientific problems, there is the theological question about the origin of Species. This is primarily a question of origin, not mutability,—of creation, not propagation. On the primary question, of course, the theologian has no doubt, for Scripture is clear warrant for the theological answer that God created things in their Species. It is equally clear that this question about ultimate origins totally exceeds the competence of the scientist, or even the philosopher, to answer.[275] There are subsidiary questions, of the sort which St. Thomas discusses in the Treatise on the Work of the Six Days, which are exceedingly difficult: such as, whether all Species were originally created in act, or only in the preternatural productive power of their several causes; whether in the course of earthly time, if plants existed in act before brute animals, and they in turn before men, the first appearance of the higher Species was an act of special creation or an evocation of the higher form from the potentialities of proximately disposed matter. In either case, the occurrence of beings having the higher Specific nature is not the result of the operation of secondary causes alone; the higher Species is not the result of purely natural generation, though it may occur through a generation in which supernatural causes are at work, and at work " naturally " in the sense of working on the potentialities of matter. In either case, the word " evolution," as used by the theologian, means the production of new Species at distinct times, a production involving Divine creativity *in some way*.[276]

There are two philosophical problems which must be faced in connection with the theological consideration of the evolution of

[275] Vd. Darwin's unqualified admission of this point in the *Origin of Species*, pp. 462-3.

[276] The propagation of individuals,—and hence of Racial types as well,—is the work of nature, not the work of Creation. Vd. *Summa Theologica*, I, 73, 2, ad 1; 74, 2; 118, 3, ad 1, 2.

Species. One has to do with the aetiology of such evolution, the cooperation of natural and supernatural causes, and here the most difficult point concerns the role of matter, both as prime and infinitely potential, and as determinately disposed according to restricted potentialities.[277] This problem, like the philosophical aspect of Racial mutability, belongs also to the philosophy of nature, as part of its general analysis of substantial change, and of matter and form as principles of generation.[278] The other problem is usually formulated as the issue between monophyletic and polyphyletic origins. A Specific nature cannot exist as such; it can exist only under the accretion of accidental determinations. These necessarily constitute not merely an individual of the Species, but also an individual of a particular Racial type, different from the indefinitely large number of other possible sub-Specific natures. Hence, in its first existential occurrence, a Species must exist as a determinate Racial and individual nature. The question, therefore, is whether it first exists in one Racial archetype, from which all other Races have evolved in the course of generations, or whether it first exists simultaneously in several Racial archetypes, underived from one another but the source, through natural mutability, of the vast assortment of Races now known. On this question, scientific evidence is as yet indecisive, though some think it leans more heavily toward the polyphyletic answer.[279] There seem to be,

[277] "Primary matter is in potentiality, first of all, to the elemental form. While under the elemental form, it is in potentiality to the form of a mixed body. Considered as under the form of a mixed body, it is in potentiality to the vegetative soul; for the act of such a body is a soul. Again, the vegetative soul is in potentiality to the sensitive, and the sensitive to the intellective. . . . After this no later or more noble form is to be found in things subject to generation and corruption. Therefore, the last end of all generation is the human soul, and to this does matter tend as its ultimate form. . . . Therefore, man is the end of all generation" (*Summa Contra Gentiles,* III, 22). Cf. *ibid.,* IV, 97 and *Summa Theologica,* I, 66, 2.

[278] Vd. fn. 271, *supra.*

[279] "I cannot doubt that the theory of descent with modification embraces all the members of the same great class or kingdom. I believe that animals are descended from at most only four or five progenitors, and plants from an equal or lesser number" (Darwin, *op. cit.,* p. 258). But Darwin also goes on to say: "If we look to the two main divisions,—namely, to the animal and vegetable kingdoms,—certain low forms are so far intermediate in character that naturalists have disputed to which kingdom they should be referred. . . . Therefore, on the principle of natural selection with divergence of character, it does not seem incredible that, from some such low and intermediate form, both animals and plants may have been developed; and, if we admit this, we must likewise admit that all the organic beings which have ever lived on this earth may be descended from some one primordial form. But this inference is grounded chiefly on analogy, and it is immaterial whether or not it be accepted" (*ibid.,* pp. 458-9). It is worth

furthermore, no conclusive philosophical reasons favoring one solution rather than another. But there is one quasi-philosophical argument which has great suggestive force. We have already seen that ontological gradation, within Specific domains, occurs only in the case of Racial types which form a progression from lower to higher modes of accidental perfection, and especially in the rank of the most extensive phyla. Now, according to the theological truth that God has disposed all things in measure, number and weight,—that, in short, God is the cause of the fundamental inequalities among things,[280]—it would seem to follow that a Species is created in a diversity of Racial types, representing the ultimate gradations of accidental perfection. Thus, if within the plant kingdom, there are two grades of accidental perfection, as non-flowering and flowering plants, these two will be the ultimate and underived phyla,—the source of all further Racial evolution; and similarly, in the case of the several grades of perfect and imperfect animals.

Finally, I would like to comment on the significance of this clarification of "evolution" for the *rapprochement* between the Aristotelian-Thomistic philosophy and post-Darwinian thought. The supposed conflict between them is forcefully stated by John Dewey in an essay on *The Influence of Darwin on Philosophy*.[281] The classic philosophy of nature and of knowledge was based on "the conception of *eidos*, species, a fixed form and final cause." Hence, "change as change is mere flux and lapse; it insults the intelligence."[282] According to the Greek and "scholastic" view,

noting that Darwin is aware that he has extrapolated the scientific evidence,—(his word is "analogy"),—when he extends the monophyletic theory to *plant* and *animal* as descending, by natural steps of mutation, from a common stock.

[280] *Summa Theologica*, I, 47, 2. This theological truth supports the hierarchical view of Species. Each natural Species, like each angelic nature, because created by God, must be higher or lower in grade of being than every other. This does not apply to sub-Species.

[281] In a book by that title (New York, 1910).

[282] *Op. cit.*, p. 6. In a recent work, *Logic, The Theory of Inquiry* (New York, 1938), Dewey writes: "The development of modern science destroyed the conception of fixed species, defined by fixed essences, upon which the Aristotelian logic rested. This destruction affected, therefore, the classic conceptions of universal and particular, whole and part, and the scheme of their relationships to one another. Modern logic, however, attempted to retain the scheme but with the understanding that it is purely formal, devoid of ontological import. The inevitable consequence is the mechanical way in which affirmative and negative propositions and their relationships are conceived in both traditional and modern formalistic logic. They have lost their ontological basis without gaining a functional relation to the conduct of inquiry" (pp. 182-3). Dewey's criticism of Aristotelian logic is thoroughly sound from the point of view of modern scientific inquiry, which requires a relational, as opposed to a predicational, logic, to account for its methods and forms.

the world created and existing in fixed and final Species is a world of stability and permanence, a world in which there is no genuine future, nothing contingent and precarious. All the changes which take place are within routinized paths laid down by the ultimate forms. Individuals go through these patterns of change from birth to death, but there is no change in Nature itself. These conceptions, Dewey writes,

> had reigned in philosophy for two thousand years. . . . They rested on treating change and origin as signs of defect and unreality. In laying hands upon the sacred ark of absolute permanency, in treating the forms that had been regarded as types of fixity and perfection, as originating and passing away, the *Origin of Species* introduced a mode of thinking which in the end was bound to transform the logic of knowledge, and hence the treatment of morals, politics and religion. No wonder, then, that the publication of Darwin's book, a half century ago, precipitated a crisis. . . . The influence of Darwin upon philosophy resides in his having conquered the phenomena of life for the principle of transition. . . . When he said of species what Galileo had said of the earth, *e pur se muove,* he emancipated, once for all, genetic and experimental ideas as an organon of asking questions and looking for explanations (*op. cit.*, pp. 1-9).

We can discount what is excessive in Dewey's statement by remembering that the Darwinian revolution does not touch the fixity of Species, that its great insights concern only Racial mutability; but we must also remember that, in Darwin's time and even today, there was and is the " scholastic " position, claiming the authority of Aristotle and St. Thomas, which treats the vast plurality of Races as if they were Species, and hence overemphasizes, as well as mislocates, the immutability of nature. Whether or not it is to be attributed to Darwin's influence, the philosophy of William James and John Dewey,—and the insights of such minds as A. N. Whitehead also,—make their greatest appeal to our generation because of their fundamental *dynamism,* their conception of *Nature in process* as having both a history and future, in which there is genuine novelty because there is real contingency.[283] If, in contrast, the

Vd. fn. 230, *supra.* But, to the extent that Dewey fails to understand the distinction between natural science and the philosophy of nature,—in fact, denying the latter,—he is wrong; and to the extent that there is a true ontological theory of species, predicational logic can be revised to give an adequate account of the type of inquiry and the sort of knowledge which is the philosophy of nature, even though such revisions must depart radically from the *Organon* of Aristotle. Vd. fn. 242, *supra.*

[283] Vd. William James, *A Pluralistic Universe,* New York, 1909, and *Some Problems of Philosophy,* New York, 1911: Ch. IX-XIII; John Dewey, *Experience*

philosophy of Aristotle and his followers takes a *static* view,— conceiving Nature as permanent and stable in its determinate uniformities,—then it deserves the attack which post-Darwinian thought has rightly made.

But contingency and dynamism are certainly central in the Aristotelian philosophy of nature. It is fundamentally a philosophy of change. Nevertheless, it must be admitted that Aristotle is primarily concerned with the dynamics of change in the individual subject, and not with the dynamism of nature itself, as having a career in which variegation occurs in time. To this extent, the post-Darwinian criticism is justified. Partly the failure is due to cultural circumstances, which made it difficult, if not impossible, to distinguish sharply enough between the two meanings of " species "; even if Aristotle and St. Thomas had explicitly drawn the line between Species and Race, they could not have fully appreciated its implications for the dynamism of nature, because they were ignorant of facts which have been discovered by later research. A real addition to Aristotelian truth is, therefore, possible, an addition which develops hylomorphism in the direction of its own central principles. The result is a richer and sounder philosophy of change, which embraces not only the careers of mutable individuals, but the temporal course of nature itself in all its infra-Specific variability. As there is growth and change in the individual between generation and corruption, so between creation and the end of time, there is the maturation of the world itself. Created nature has grown and developed, has flourished and decayed, in the course of generations; and the basic principles of this history, with its partially unpredictable future, are two: the potentiality of matter and the contingency of form.

The Aristotelian philosophy is thus made truer to itself by the resolution we have made of the problem of Species. It is one of the merits of the first position that this is a consequence. The writings of Charles DeKoninck, who takes the position that there are only four or five Species, show how it leads to a deeper understanding of the dynamism of Nature.

An intelligence constrained to time, and which contemplates the universe at its beginning, or whose vision is limited to the natural inferior forms, would be able to see or predict with absolute certainty only the human form. Its knowledge of the intermediary sub-species would always be more or less conjectural. All the sub-species would be, at a certain moment of

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and Nature, Chicago, 1925: Ch. II, III; and also A. N. Whitehead, *Process and Reality,* New York, 1929.

existence of the world, and to a greater or less extent, future contingents. That spirit would *predict infallibly* vegetative and animal life, but it would not know determinately all the ways in which they would be realized. We see then in what sense there is necessity in nature, and in what sense there is contingency. There is necessity because of the end; there would be necessity of the means, as in the case of freedom. But the means which are effectively engaged in the order of execution are not rigorously determined in the original outline of the world (*Le Problème de L'Indetérminisme, loc. cit.*, p. 128).

We are in a universe which is in a state of maturation. One can compare it to an immense embryo. In this process itself the world uses itself up little by little. The certitude of the way is paralleled by a growing incertitude of what one calls in physics, very vaguely, matter. The degradation of energy will end by choking the life which it has sustained and for which it disaggregates itself (*ibid.*, pp. 158-159). Cf. *Summa Contra Gentiles*, II, 22-24.

DeKoninck conceives the growth of the world as evolutionary in two senses: (1) the multiplication and mutability of Racial varieties, the evolution of species; and (2) the emergence of higher grades of being from lower, the evolution of Species.[284] Both sorts of evolution are not only thoroughly compatible with all the principles of hylomorphism, but the philosophy of nature which properly recognizes them fulfills the implication of these principles as well as does justice to all the established facts.[285]

[284] The two meanings of "evolution" here indicated are in distinct dimensions. The evolution of species, with which the scientist is concerned, is a proliferation of accidental types, involving the generation of new forms and the extinction of old ones. There is nothing progressive about such evolution, in the sense of the emergence of higher from lower forms. Emergent or progressive evolution is the evolution of Species, the appearance in temporal succession of essentially higher natures. The problem of such emergence is theological, not scientific. Much that has been written by philosophers on emergent evolution is confused because it fails to distinguish the two meanings of "evolution" and of "species," and hence the scientific and theological dimensions of the total problem. The proper task for the philosopher, with respect to evolution, is primarily the analysis of the principles of substantial change, as bearing on the production of the *unlike*, both *accidentally* and *essentially*, in the process of procreation. By means of such analysis he will not only be able to shed philosophical light on both the scientific and the theological problems, but also to relate them in their bearings on one another.

[285] "It is the intention of universal nature which is primary and principal, and in this perspective the corruption of individuals and species is natural. But the birth of new species is also natural, even when they are superior to the natures from which they proceed. . . . The reproduction of like individuals cannot be the last end of the infra-human species, since a multiplication itself blocks itself in the unrealizable indefinite. Something else must proceed therefrom which is more perfect. Moreover, in the cosmic order, all generation is essentially provisional. (And it is this that the 'fixists' forget when they attribute properties to natural generation

VII. CONCLUSION

28. It is necessary to say once more that the problem of species has not been solved. The dialectical consideration of the objections to each of the opposing theories did not result in a demonstrative resolution. Each theory had its difficulties,—objections which it did not adequately answer. At the same time, the two theories were not equally balanced in their merits and disadvantages. Because a weighing of the *pros* and *cons* seemed clearly to favor the first position, we were led to attempt a tentative resolution of the issue in order to develop its consequences. We proceeded *as if* the first theory were true, and the second false. The *as if* must not be forgotten. Otherwise, the whole of the foregoing discussion of these consequences (Part VI, *supra*) will be misapprehended. It is strictly an extension of the dialectic. To read it as if it were demonstrative is to make it viciously dogmatic. It should be read for the sake of the illumination it throws upon the problem itself. If the second theory had been favored as better (*apparently more true*) than the first, and if a tentative resolution had been undertaken by treating the second position *as if* it were true, the problem would have been differently illuminated, for the consequences would have been different. In either case, the principal problem and all its subsidiaries remain the same.

The problem, I say, remains a problem to be solved. If anyone disagrees with this conclusion, he is obligated to argue one of three alternatives: (1) that the problem is itself not genuine, but falsely generated by principles which are not themselves acceptable; (2) that the problem is not a problem, in the sense of something solvable, but a mystery; (3) that the problem is no longer a real problem because it has been satisfactorily solved.[286] To show the

which agree only with generation in God.) The inferior natures are in function of universal nature itself in generation. And therefore when a superior nature is produced from the potency of an inferior nature by equivocal generation, this production remains natural, obviously not in relation to the inferior agent considered as inferior . . . but to the extent that it responds to the desire of the inferior nature, in so far as it is ordered to the good of universal nature, and to the intrinsic last end of the world. And if the constitution of the hierarchy of cosmic species is an '*opus naturae*,' the irregularity of this gradation, such as is apprehended by experimental science, is sufficiently explained" (DeKoninck, *Réflexion sur le Problème de L'Indetérminisme*, Revue Thomiste, XLIII, 2, pp. 239-240).

[286] Cf. the enumeration of possible steps of adverse criticism which I made at the very opening of this article (Pt. I, Section 2, *supra*). For the sake of profitable and orderly discussion of this sort of investigation, those who disagree with what has been said should carefully observe the conditions of controversy: either the problem is genuine or not; *only if it is*, is there a further alternative, namely, that

first requires, it seems to me, a refutation of hylomorphism, and of the metaphysical principles on which it rests. To show the second, it would be necessary to show that the opposing theories follow perfectly from the same antecedent principles and are, like the conclusions of an antinomy, perfectly balanced in their appeal to reason and fact. To show the third, one of the two theories would have to be demonstratively established in such a way that all objections could be answered and all difficulties solved. To conclude, as I do, that the problem with which we began is still a problem means that whatever analysis has been accomplished argues against the three possibilities enumerated. It does not mean, however, that the only accomplishment is negative in this sense; for it seems to me that the first theory is clearly better than the second and, insofar as this has been shown, we are nearer to a solution.

I must confess some sympathy with those who would argue that the problem is solved by the demonstration which has been made of the superiority of the first position,—its consistency with all the basic antecedent principles, its ability to meet almost all objections, and the striking confirmation of its truth by the way in which it leads to good solutions of other problems in the philosophy of nature and on the borderlines of philosophy and science. They might argue, further, that the few unresolved difficulties, such as those with respect to inorganic forms and species, need not deter us from accepting the first theory as a solution of the problem, and as the true account of these matters,—*even if these difficulties are incurable, and constitute a margin of mystery on the periphery of the problem.*

There is genuine humility in such a point of view. It is rash to expect too much perfection in any human theory. The doctrine of

it is or is not already solved by traditional writers; *and only if it is not already solved,* is there the question whether it is solvable. Finally, *only if solvable,* though not previously solved, can there be argument as to whether the two theories herein proposed as solutions are exhaustive; *and only if exhaustive,* can there be argument concerning which is true.

My own position can be summarized in the following claims: (1) the existence of a genuine problem, ignored by the tradition, has been definitely established; (2) this problem, because ignored, has not been traditionally solved; (3) yet it is a solvable problem rather than a mystery; (4) the two possible solutions are exhaustive; at least, other alternatives are negligible; and (5) of these two, the first theory, which affirms an ontological hierarchy and a small, definite number of species, has been *almost* completely demonstrated to be true, failing as an adequate solution of the problem because it is marred by one or two difficulties still unresolved.

hylomorphism is unduly exalted by those who regard it as perfect,—without the blemish of a single difficulty or unanswerable question. To claim for it only that it has fewer such imperfections than any other human doctrine is to praise it properly, in the light of a mean relative to human nature, which prudence appoints for the accomplishment of intellectual virtue. Within the limitations of human wisdom, one philosophical theory is better than another, not by reason of having *no* flaws or difficulties, but by reason of having *fewer,* and of having these fewer *insolubilia* occur in the right places, in the right way, and, one might almost say, for the right reasons.

On such grounds, the first theory concerning species might be justifiably regarded as *no more imperfect* than is the whole doctrine of hylomorphism, of which it is a part,—better than the alternative theory, as hylomorphism itself is better than any other doctrine in metaphysics and the philosophy of nature. That this first theory has difficulties in accounting for the constitution of the lowest species of substance, or in determining the essential difference between elements and mixtures, is a sign of its goodness, because it is a failure occurring in the right place and for the right reasons; just as it is a sign of the soundness of hylomorphism in metaphysics that it locates and intensifies the theological mysteries of the Incarnation, the Eucharist, and the Resurrection, where any less true doctrine concerning substance and essence, matter and form, might dispose of these mysteries more readily or even evade them entirely. By the same token, a theory of species which, through having a less strict conception of hierarchy, had no difficulties in analyzing elemental bodies, would be less sound than one which acknowledged its perplexity at this point, because the nature of elemental bodies is a perplexity proper to the philosophy of nature.

If I resist the tendency to concur in these reasons for regarding the first theory as true,—i. e., as true as any theory can be expected to be,—if I persist in concluding that more work remains to be done before the problem is really solved, it is only because there is another voice of prudence which counsels that we have only begun to see the implications of hylomorphism for an analysis of inorganic substances in the light of modern scientific research. We must estimate our intellectual responsibilities in terms of our concrete historic position in a developing culture. Certainly, the work of philosophy is not yet finished; on the contrary, there is evidence that we may be entering on a fresh historic moment when, after the frustrations and confusions of the first few centuries of modern times, we may be able to reap the fruits which belong properly to a culture in which science finds its place alongside philosophy and

theology in the fulfillment of human enlightenment. A fruitful *rapprochement* between natural philosophy and the natural sciences is just becoming possible, after years of misunderstanding and destructive feud, and such promise bears directly on the remaining difficulties in the problem of species. It seems prudent, therefore, to postpone a final judgment, and to forego a settled acceptance of difficulties as *insolubilia,* when these very difficulties lie directly in the path of an advance in philosophical thought,—an advance which promises to be the characteristic achievement of our epoch in the centuries to come.

29. We need not wait, however, for the bourgeonings of time. There is immediate work to be done, work which may prepare the way for a synthesis we can but vaguely foresee. If an ultimate solution is to be reached in terms of the first theory, a satisfactory account must be given of substantial form and specific nature in the sphere of inanimate things. To that end, and also because we have discovered other problems in metaphysics and the philosophy of nature upon which the theory of species depends, we must undertake the investigation of related questions. The problem of the composition of material essences must be further studied. The analysis of substantial change, of the generation and corruption of both living and non-living substances, must be developed beyond the present state of the traditional doctrines. We must be able to explain the criteria by which accidents are specified, especially such accidents as power, habit, and act. In all of these matters it may be too early to accomplish more than a partial clarification and a qualified resolution of the problems, but the more definitely we understand these problems and what is requisite for their complete solution, the better we have performed the work that seems allotted to our day. We are living at a time when the main philosophical task is to clear away the accumulated underbrush which obscures the field of vision.

The three problems which will be investigated in subsequent articles,—the problem of essence, the problem of substantial change, and the problem of the specification of accidents,—are problems which the Thomist should delight in recognizing. Each is not only a problem in its own right, capable of independent formulation, but as we have seen each is intimately involved in the solution of the problem of species. The problem of inorganic substances will not be directly attacked, though light may be shed on it by a consideration of substantial change and accidental specifications.

Perhaps, these problems are so related that none will be solved until all are analyzed. If the problems are genuine, there is work to be done in philosophy; and, at least, one can hope that the brilliant past of the traditional doctrine contains the secret which, if wisely read, will lead to an equally brilliant future.

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EDITORS' NOTE: We append Dr. Adler's outline of the complete problem and its investigation. Sub-headings 1-23 were covered in preceding issues. The present (Fifth) installment, covering sub-headings 24 to 29, completes the study.

THE PROBLEM OF SPECIES

OUTLINE

I. INTRODUCTION

1. The series of articles projected: nature of philosophical *problems*
2. Significance of problems *for Thomists*
3. The limited scope of the first article as dealing with the problem of species: its locus in the philosophy of nature, and its relation to other departments of philosophy
4. Outline of the article in its main divisions.

II. ANTECEDENT PRINCIPLES

5. Preliminary statement: why these principles must be stated to formulate the problem
6. } Three metaphysical principles, *directly* relevant
7. }
8. }
9. Transition to other principles relevant only *tangentially*
10. Logical and epistemological considerations: their discussion
11. Indicates why a separate section must be devoted to the theory of our knowledge of species.

III. EPISTEMOLOGICAL DIMENSION OF THE PROBLEM

12. Exposition of 4 answers to the question: how many substantial species do we know adequately (by real definitions)?
    a. The position of Rousselot: none
    b. The position of Maritain and Garrigou-Lagrange: one
    c. The position of the decadent scholastics: a very large number
    d. The fourth position: five
13. Dialectical summary of the opposition of these four doctrines, which leads to the discovery that the epistemological issue cannot be resolved at all unless the ontological problem of species can be independently solved.

IV. Exposition of the Problem in the Philosophy of Nature

14. Preliminary statement of the issue as constituted by two positions, i.e., two answers to questions concerning the order and number of substantial species
15. Exposition of the first position
    1. Capital texts from Aristotle and St. Thomas
        a. Texts in re: the order of species
        b. Texts in re: the species of living things
        c. Texts in re: the species of non-living things
    2. Propositional summary and analytical explication of the doctrine contained in these texts
        a. Five propositions concerning the constitution and order of species
        b. Two propositions concerning the number of species
        c. One proposition concerning infra-specific distinctions
    3. Texts from contemporary writers in the tradition of Aristotle and St. Thomas, which *appear* to take this first position
16. Exposition of the second position
    1. Capital texts from Aristotle and St. Thomas
        a. Texts in re: the species of non-living things
        b. Texts in re: the species of living things
        c. Texts in re: the order of species
    2. Propositional summary and analytical explication of the doctrine contained in these texts
    3. Texts from contemporary writers in the tradition of Aristotle and St. Thomas, which *appear* to take this second position
17. Comparison of the two positions
    1. What is common to the two positions
    2. Wherein they differ principally
    3. Why no third position is possible
    4. The dialectical possibilities: either one doctrine is true and the other is false; or some reconciliation of the two is possible by an equivocal use of the word "species."

V. The Dialectic of the Issue

18. Preliminary statement of the dialectical procedure
19. Objections to the second position, with answers so far as possible
20. Objections to the first position, with answers so far as possible
21. Evaluation of the relative merits of the two positions
22. Consideration of the dialectic in relation to the epistemological dimension of the problem
23. Consideration of the dialectic in relation to other problems in metaphysics and the philosophy of nature

VI. The Consequences of a Tentative Resolution of the Problem

24. The tentative character of any resolution
25. Reconciliation of contrary texts with each other and with a resolution favoring the first position
26. Consequences of the resolution in epistemology and logic
27. Consequences of the resolution in the philosophy of nature

VII. Conclusion

28. Determination of the question, Whether the problem is genuine or false; or if genuine, whether a mystery or solvable?
29. Transition to later problems in the series.

BOOK REVIEWS

Christianity and Morals. By Edward Westermarck, Ph. D., LL. D. New York: The Macmillan Company, 1939. Pp. 427. $5.00.

This is a vast book and, seen from a distance, as impressive as a medieval cathedral. Indeed, in the sweep of its plan it has something of the magnificence and daring of the dreams of the men who saw the cathedrals before they were built. Perhaps if Dr. Westermarck had seen this vague resemblance, he would not have tried to build this book alone; the cathedrals were not thrown together by one man in the course of a life time. To write the book he intended, the author would have had to be a philosopher, an historian, a scripture scholar, a theologian and a canonist—at least these—and all of the first water.

Unfortunately Dr. Westermarck is none of these things; his bid for fame rests upon his interpretations of the findings of anthropology. But he is a dreamer of great dreams; for that, we can be sincerely grateful.

He proceeds in orderly fashion, to bring his dream to life by laying down the philosophical foundations that must bear the weight of the rest of the argument. The notions of religion and morality are discussed and analyzed; then the relation of morality to religion. Apparently overlooking the necessity of determining what he means by the Christian religion, Dr. Westermarck goes on to establish his notion of Christian morality, tracing it through Christ, Paul, the Fathers preceding Augustine, the theologians from Augustine down to and including the reformers, concluding with chapters on Asceticism and the Sacraments. All this is accomplished in some two hundred pages. The next hundred plunge the reader into detailed examination of Christian morality (sic) and special problems: human life, economics, slavery, truth, marriage, divorce, irregular sex relations, the lower animals. The book closes with a lengthy summary and two indexes, one of persons, the other of subjects; the summary, by the way is particularly faithful both to the spirit and the content of the book.

Thus it is clear the book is made up of four parts: (a) a philosophical treatise on religion and morality; (b) a scriptural and theological treatise on the nature of Christian morality; (c) an historico-theological study of particular problems in their relation to Christian morality; and (d) a summary. The last three parts follow the same technique and are thus subject to the same criticism, a criticism that may be endlessly detailed or as brief as one sentence and yet be entirely effective. For these last three parts are all selections and interpretations of facts, reports, texts, principles, travellers' accounts, rumors and guesses. But the first, the philosophical part, is not a

matter of selection and interpretation but of reasoning. Its merits or faults make their plea on the grounds of reason; by reason's verdict they must abide. It is this section of Dr. Westermarck's work that we prefer to study in some detail, for in its light all the material of the rest of the book was seen by the author.

II

Dr. Westermarck attacks the philosophical problem with the true philosophical arms of definition and distinction. Religion can be considered either in the abstract or the concrete. In the first sense it is a regardful attitude towards a supernatural being, on whom man feels himself dependent and to whom he makes an appeal in his worship. Its origin is the origin of the belief in the supernatural, i. e., a feeling of uncanniness or mystery; it is sharply distinct from magic, for this latter uses supernatural energy mechanically discharged under its coercion. Both religion and magic have a common note of mystery and, in the concrete, they may be inextricably mixed.

In the second sense, in the concrete, religion is a system of beliefs and rules of behavior which have reference to, or are considered to be prescribed by, one or several supernatural beings whom the believers call their god or gods—that is, supernatural beings who are the objects of a regular cult and between whom and their worshippers there exist established and permanent relationships.

So much for religion. The treatment of morality is no less orderly. All moral concepts are based on retributive emotions, specifically the retributive emotions of moral approval and moral disapproval. While these two are related to the other retributive emotions (the first to gratitude, the second to anger) they alone are moral because of their distinctive characteristics of disinterestedness and impartiality.

Moral disapproval is a hostile attitude of mind towards a living (real or apparent) being conceived as a cause of inflicted pain; moral approval is a friendly attitude of mind towards such a being conceived as a cause of pleasure. The disposition to feel these emotions is an evolutionary product of reflex actions, the result of the influence of natural selection in the struggle for existence. Both achieve their disinterestedness and impartiality through the social character of their origins; for society is the birth-place of the moral consciousness and the first moral judgments expressed not the private emotions of isolated individuals, but emotions felt by the society at large. Tribal custom was the earliest rule of duty; in fact in the early society customs are not only moral rules but the only moral rules ever thought of; there is no such thing as a private conscience.

This social origin of moral consciousness explains why a moral judgment here and now does not necessarily involve moral emotion in the one judging; there is a kind of objectivity attained by the translation of emotional states

into terms of qualities assigned to external phenomena. We classify these phenomena in this way because they have evoked moral approval or disapproval either in ourselves or in others from whom we have learnt the use of the words we apply to them. The social origin of these judgments also explains the quasi-universality, or general resemblance, to be found in moral judgments; yet at the same time, they remain essentially relative because they remain essentially emotional and emotion is not a stable or absolute thing.

This is not to say that intellectual factors play no part in moral judgments. On the contrary, their role is extremely important, particularly in the variability of moral judgments. For emotions are determined by cognitions and differ in nature or strength according as the cognitions differ. Such, for instance, are the different cognitions as to the nature and implication of a moral judgment, the different measures of forethought, of knowledge based on experience of the consequences of conduct, degrees of reflection, knowledge or ignorance of specific religious or superstitions beliefs, and so on.

The connection between religion and morality is extrinsic and the product of development. The development of the gods follows a curve of change for the better, until at last they are ideals of moral perfection. They have been particularly singled out by particular peoples according to their usefulness. Their gradual connection with morality may be traced to multiple factors, all however extrinsic: their connection with the blessings and curses of men, a personification of magical forces into divine attributes, the persecuting ghosts of murdered men, human analogies and ancestor gods, attribution of excellency to gods by men, and the unsatisfied claims of justice in this world.

Unquestionably religion has added sanctions to the social and legal sanctions of morality. But it may detract from these other sanctions by the remoteness of its sanctions, the time allowed for repentance, the concentration on these new (religious) duties to the neglect of social and legal duties. It is certainly not true that the moral law would not command obedience without belief in a future life. And religion does not give objective validity to morals. Morals remain, not objective, but relative. Belief in God is not a presupposition to morals; no divine revelation is necessary; nor can morals depend on the will of God, to be changed instantly by the divine will.

III

It would be comparatively simple to point out the gaping holes in Dr. Westermarck's theory of the relativity of morals. The fact, for example, that he has given no radical explanation of the retributive character of retributive emotions; falling back on reflex action and natural selection does not offer an explanation but an historical description of a process. Or again

the necessary contradiction involved in the social origin of morals: at some mysterious point there must have been a society without morals, or morals without society for morals arise only in society and society cannot begin to exist without morals. There is his prodigious assumption that tribal customs were the only moral rules in the early society. And his tortured explanations of why emotions are not emotional and the rational is not really reasonable. But there is little to be gained by concentrating on such defects. It would be much more worth while to sift his theory painstakingly for the grains of truth he has harvested from his years of study of anthropological data. This approach to Dr. Westermarck's theory has particular value when we remember that his conclusions were reached primarily, not by philosophical speculation, but from brooding on facts. In other words, his doctrine should not be dismissed as idle theorizing; the man has seen something, there is something in what he says, some solid foundation. The fault is rather that he has seen too little than that he has seen too much in these facts. This becomes quite clear when we compare his findings with Aquinas' account of morality and religion; something that Dr. Westermarck himself has for some reason neglected to do, though he saw the rationally independent character of St. Thomas' doctrine, and Thomas in his defense of the objective character of morals, was the only objective champion the author of this book sidestepped completely.

IV

Dr. Westermarck's distinction of religion into abstract and concrete, as he defines these two, conforms roughly to Thomas' definitions of the moral virtue of religion (a part of justice) regulating man's relations with his first and last principle and of the Church. But Thomas finds the origin of this moral virtue, as of the others, not in fear, a feeling of uncanniness or of mystery, but in man's natural thirst for perfection and natural push towards a goal. It is not a regardful attitude towards a supernatural being, but a good habit subjected in the will of man which undoubtedly produces such a regardful attitude and worship.

On the side of morals, the comparison of Dr. Westermarck with Thomas demands some clarification of terms. The former's use of " emotion " rather clouds the issue, for it has become a vague word in modern usage. If we express the same notion by calling it a movement of appetite—either rational or sensible—we shall find Thomas insisting that morality does arise from the natural movements of appetite, from the natural inclinations. But Thomas distinguishes further between the movement of appetites to the ends of the appetitive faculties and to the means by which those ends are to be obtained. In the first sense, the natural inclinations of appetite are the rule of reason, the norm of its truth, the basis of the distinction of good or bad according as things conform to that natural appetite or conflict with it.

Relative to the means to those ends, reason is the rule of the appetites—and this is precisely the field of moral law. St. Thomas puts the thing briefly when he says that the principles of prudence are furnished by the ends of the moral virtues. Moral precepts, then, are not primarily emotional but primarily rational, though their roots are deep in the appetite of man There is no necessity of searching desperately for an explanation of their undoubted impartiality and disinterestedness; for the norm by which they are made is the norm of reason, their conformity or lack of conformity with the immediate rule of the actions of man. The natural inclinations, their recognition, and the consequent approval or disapproval of things or actions in relation to them all flow from the very principles of human nature. They do not wait upon the formation of society and the slow building up of custom; they are effectively operative with the dawn of reason. This norm of morality has all the stability of human nature itself; yet all the flexibility of the variation in the value of particular means to particular ends.

According to Thomas, the connection between morality and religion is intrinsic, the connection between cause and effect; *but it is morality which is the cause, religion which is the effect.* Thomas would agree with Dr. Westermarck that no revelation is necessary for the constitution of morals; that the goodness and badness of things do not depend on the will of God; even that a belief in God is not essential for the existence and operation of a moral law. But his agreement would not be on the grounds that there is only an extrinsic connection between religion and morality. Rather, he would argue that morality flows from the very nature of man; it demands the existence of God for its existence, as the nature of man demands the existence of God; but it does not demand a knowledge of that existence of God. It flows from principles that have ontological value; its immediate, though secondary, cause is the reason and appetites of man, a true cause producing a true effect, though always dependent on the first cause. The acts of the virtue of religion are commanded by the natural law; where morality exists without religion, that law is operative but imperfectly so, one of its commands has been wiped out of the hearts of men. Supernatural religion, of course, with its supernatural goals, supernatural helps, and supernatural life—is another question altogether; precisely because it is so utterly above nature, its entirety must come from without man.

Perhaps we could summarize this comparison of Dr. Westermarck with St. Thomas by pointing out that while one argued from facts with little reliance on principles, the other argued from principles with the help of the scanty facts at his disposal; their conclusions are miles apart. But the opposition of their conclusions is no gauge of their relationship. Actually if Dr. Westermarck had been furnished with a clear concept of emotion and the distinction of appetite's movement to end and to means, his facts would have shouted the message they so desperately tried to whisper to him—and so very nearly did.

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It was years and years ago that Dr. Westermarck first elaborated his theory of relative morals. He never escaped from the original philosophical confusion that led him to his conclusions; but then, too, he never tried to escape from the insistent claims of the facts. In this book he outlined a study that might well have been magnificent; for the daring of the plan, he is to be congratulated. But, aside from the plan itself and the philosophical part of the book, one wishes that the book had not been wirtten. In the fields of Sacred Scripture, theology, history and canon law Dr. Westermarck has hopelessly bogged down. A scholar in these lines can hardly be irritated at him; for the breakdown is so complete, the solemnly substantiated absurdities so ludicrous, the selection of authorities so naively credulous, the dusty, time-worn myths so pitifully clung to that one can only be sorry for the author of it all. The latter part of the book is monumental, but a monumental ruin reconstructed from the very stones that were long ago blasted by the bolt of truth.

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BRIEF NOTICES

Predestination. By Reginald Garrigou-Lagrange, O. P., S. T. M. Trans. by Dom Bede Rose, O. S. B. St. Louis: Herder, 1939. Pp. xiv + 382, with index. $3.00.

In this latest work to be presented to the english-speaking public, Fr. Garrigou-Lagrange turns to one of the most difficult mysteries of the Christian religion, the predestination of the saints to glory. The author expresses his purpose in the Preface: "The scope of this book from beginning to end is the reconciliation of the two principles of divine predilection and possible salvation for all. On the one hand, 'no one thing would be better than another, if God did not will greater good for one than another.' On the other hand, God never commands what is impossible, but makes it possible for all who have come to the use of reason to fulfil the precepts that are of obligation, when and as these are known to them."

An intelligent approach to any mystery of the faith implies two things: first, a recognition of precisely where the mystery lies; and, secondly, an evaluation of the objections brought against the mystery by non-believers, which shows that none of the objections are valid. There are scores of real difficulties surrounding every mystery, but they never amount to a contradiction.

A careful study of Fr. Garrigou-Lagrange's book will give the reader such an intelligent appreciation of the mystery of predestination and its difficulties. Scripture, Tradition, and theological investigation are all used in the course of the work. The doctrine of St. Thomas is fully presented; other theories are evaluated in its light.

The concluding section of the work treats of grace in its relation to predestination. Special consideration is given to the nature of sufficient and efficacious grace and the conciliation of divine premotion with the free will of man.

This is not a popular exposition; it is a full-bodied theological treatise. Nevertheless, a careful reading of it will give the intelligent reader, even though he be not a professional theologian, a real appreciation of the mystery of our predestination. The book concludes with four appendices and an index. The translation is an accurate and readable reproduction of the original.

The Philosophy of Communism. By Charles J. McFadden, O. S. A. New York: Benziger Bros., 1939. Pp. xx + 345, with index. $3.50.

This work represents painstaking research and a comprehensive understanding of the subject treated. The first part, devoted to exposition, is

rich in quotations from authorized editions of primary sources; it permits the Communists to present their own position. An introductory chapter, concerned with the historical barkground of the Communist system, is followed by an orderly textual presentation of its philosophical principles. Individual chapters treat of the Communist philosophy of Nature, Mind, History, the State, Religion, Morality, Revolution and Society. Exposition is thorough and completely objective. The second part contains a chapter for chapter critical evaluation of these principles in the light of Scholastic philosophy.

The Prospects of Philosophy. By John J. Rolbiecki, A. M., Ph. D. New York: Benziger Brothers, 1939. Pp. xiv + 161. $2.50.

In an objective examination of contemporary trends in philosophy and science, Dr. Rolbiecki makes an historically supported conjecture of the prospects of philosophy. His examination includes the relation of philosophy to mathematics, religion, conduct, to social life, politics, and history, as well as a search into current thought on the physical cosmos, life, mind and personality, the Supreme Being, and the beautiful. There is a plea for a modern philosophical synthesis, and one is encouraged by the philosophical outlook. Throughout these discussions there is generous indication of unsolved problems, of incomplete knowledge, of unproven theories. A good index completes the work. The attempt to be objective has, at times, caused the omission or the insufficient emphasis of truth already possessed. If, besides the Foreword, there were a chapter on the nature of truth and certitude, the possible impression that philosophy is eclectic, skeptic, and agnostic would have been eliminated. For the philosophy student the work will serve as a spur to originality of thought, new applications of principles, and a reasonable testing of many philosophical theories in the light of recent scientific discoveries.

"Natural Law Symposium," *Notre Dame Lawyer*, November 1939. Vol. XV, Number 1. University of Notre Dame, Notre Dame, Indiana.

This symposium aims at a definition of Natural Law in terms understandable by all so-called "jurisprudes." It issues an invitation to all who have an opinion about what Natural Law is to submit a statement of their opinion and enter into an open forum on the subject. This obviously important discussion gets off to an excellent start in the three articles that make up this symposium.

"One 'Realist's' View of Natural law," an important contribution by Karl N. Llewellyn, shows the points of contact of a "natural law man" and "a realist" by means of a distinction between the philosopher's natural law and the lawyer's natural law. Actually this distinction seems to be between two sets of principles, i. e., the remotely, and the more immediately,

applicable principles and the actual application of these principles. But the point is well made that frequently these antagonists are defending the same things. "The Real Natural Law," by Charles Sumner Lobingier, by the very confusion it labors under and the extremely narrow limits to which it confines its consideration of the natural, brings out the necessity for a comparative study of the part of nature and custom in the making of law. "Natural Law and The Law-Making Function in American Jurisprudence," by Brendan F. Brown, probes deep and lays solid foundations for a fruitful union of philosophy's wisdom and jurisprudence's knowledge. A brief introduction showing the part played by the concept of natural law in the American legal system, is followed by an exposition of the four erroneous deviations from the Thomistic-aristotelian notion of natural law that are observable in the history of American Law. All attacks on natural law have been attacks on these counterfeit notions. Dr. Brown's analysis of the faults of these four opinions, his statement of the Thomistic position, and the program of study and action he outlines and insists upon as a remedy for the present critical situation in legal studies, makes this issue of *The Notre Dame Lawyer* indispensable to both the philosopher and the practitioner of law.

St. Thomas and the Greeks. By Anton C. Pegis, Ph. D. Milwaukee: Marquette University Press, 1939. Pp. 107 with notes.

Dr. Pegis in this volume of the *Aquinas Lectures* gives vitality to the principles of the Angelic Doctor by placing them in the milieu in which they were proposed. He selects as the major issue of the 13th century the relation of St. Thomas to the Greeks and their Arabian successors. With apt historical precision it is maintained that St. Thomas not only recognized the fundamental issue at stake but also interpreted accurately the basic philosophical notions of these philosophers. It is to the problem of creation, according to the lecturer, that Aquinas reduced the differences between his own philosophical ideas and those of the Greeks. Professor Arthur Lovejoy is brought into the discussion by reason of his insistence that Christian thinkers have continued a metaphysical contradiction begun by Plato as to the relation between creation and the Creator. The burden of the lecture consists in a most scholarly historical and philosophical analysis and dissipation of this charge. The doctrine of Plotinus is placed in opposition to that of Aquinas and the latter's dialectical and rhetorical superiority is clearly seen.

Paul and the Crucified. By Wm. J. McGarry, S. J. New York: American Press, 1939. Pp. xx + 272, with index. $3.00.

This modest book presents to the public a series of lectures given by the author to his seminary students and is welcome because of the appalling

dearth of Catholic books in English dealing with St. Paul and his doctrine. Two historical chapters, of which the second is very interesting, give a picture of Paul before and after conversion and describe the world's reaction to his preaching. Then follow chapters on Christ the Savior, High Priest and Victim, on the Mystical Body and on the meaning of "In Christ Jesus." The chapter on Sacrifice is very well done.

Exception is taken to the note on p. 2. In spite of Meistermann (and also of H. V. Morton), whose archeological attainments cannot be mentioned in the same breath with those of PP. Vincent and Abel, the earliest Christian tradition (Lucien of Caphargamala, d. 415) and all the texts declare that Stephen was martyred to the north of the city, in the direction of Kedar (i. e., Caesarea, not Cedron). The tradition placing the stoning in the Cedron valley is based on IXth century texts. The present basilica of St. Stephen rises upon the site of the basilica built by Eudocia (d. 460) upon the traditional site of Stephen's martyrdom.

The average reader will certainly be charmed by the not infrequent flashes of insight and appreciation which adorn these pages.

The Pope's Plan for Social Reconstruction. By Rev. Chas. P. Bruehl, Ph. D. Professor of Sociology at St. Charles Seminary, Overbrook, Pa. New York: The Devin-Adair Co., 1939. Pp. 356, with bibliography and index. $3.00.

With the publication of his latest work, *The Pope's Plan for Social Reconstruction*, Rev. Charles Bruehl has contributed a timely and distinctive addition to current literature on Catholic social philosophy. The plan for social rehabilitation, recently published by the American Hierarchy, finds a splendid commentary in this really profound book. Dr. Bruehl's rich sociological background and his varied practical experience give definite distinction to his analysis and presentation of the Papal program.

The Papal plan for social reconstruction, as implicitly contained in the Encyclicals "Rerum Novarum" and "Quadragesimo Anno," is not an elaborate blue print with detailed specifications. Rather it is a broad outline for integration, whose delineation presupposes a full knowledge of Christian morality. Superficial study of the Encyclicals results either in an attitude of mind that views the Papal program as an unattainable utopia or in a conviction that here is just another design for Totalitarian dictatorship.

With full appreciation of this unfortunate misunderstanding Dr. Bruehl has devoted practically half his book to an explanation of those fundamental moral principles upon which is reared the superstructure of the Christian social order. The remaining chapters, outlining the structure and functions of Corporatism, are done in masterly style. Those who read Father Bruehl's thorough and lucid analysis of the nature, origin, and genesis of Christian Corporatism will find here a scientific treatment of a subject which, outside of Catholic circles, has been largely misunderstood.

The Pope's Plan for Social Reconstruction can be unreservedly recommended. It is the scholarly work of an authority whose recognized qualifications make it an outstanding contribution.

The Establishment of the University of Being in the Doctrine of Meister Eckhart of Hochheim. By Professor BERNARD J. MULLER-THYM, Ph. D. New York: Sheed and Ward, 1939. Pp. xx + 140 with bibliography and index. $2.50.

Professor Muller-Thym has undertaken to make critical historical inspection of: ". . . the one problem of how Meister Eckhart could say that all things exist by the existence which is God, and yet save the necessary distinction of God and creatures" (p. xv). Beyond question the venture has been remarkably successful. The book contains three sections. The first or introductory section contains a restatement of Eckhart's principal propositions. Only authentic works are quoted and while the quotations objectify the problem they also force the reader to doubt about Eckhart's true position. Would he really "make the being of God that by which creatures exist formally" (p. 8), or does he believe sincerely "that nothing can be so far apart as God and creatures" (p. 10)? In the second section genetic causes for the trend of Eckhart's thought and expression are assigned. The *totum potestativum animae* of Saint Albert and his general teaching on the nature of the soul have been outlined by Professor Muller-Thym and serve to give a partial clue towards the manner in which the problem indicated in section one will be resolved. It is in the final section that we are given a description of Eckhart's "*ipsum esse* at two moments of its being, one at which it is present to the creature as touching it, the other at which the same *esse* informs the creature by an act of penetration" (p. 83).

La "Filosofia Prima" di Aristotele. EMILIO OGGIONI. Università Cattolica del Sacro Cuore: (Saggi e Ricerche: Serie Prima: Scienze Filosofiche, Vol. I) Milano: Soc. Editrice "Vita e Pensiero," 1939. Pp. xii + 207. 12 lire.

We are happy to welcome this latest contribution of the University of Milan to scientific research. The authorities of the University promise us a series of publications in various fields of scholarship, such as, e. g., philosophy, law, philology, history, etc. The works are from the pens of young doctors in the different faculties of the University.

In the first volume of the philosophical series, E. Oggioni, following the theory proposed by W. W. Jaeger about the development of Aristotle's thought, takes as his problem the evolution of the Aristotelian idea of "First Philosophy." His thesis is that there are three stages in this evolution. First, Aristotle, still under the influence of Plato, conceived "First Philoso-

ophy " as theology, or the science of the suprasensible. Secondly, he came to conceive of it as the science of the supreme principles or causes of reality. Lastly, he arrived at the notion of " First Philosophy " as the science of being as being. The substantiation of the thesis is accomplished in two parts: the first treats of the chronology of the pertinent Aristotelian works; the second examines carefully the actual texts of the Stagirite.

The Mystery of the Divine Motherhood. By CHARLES FECKES. Trans. by Canon GEORGE SMITH, D. D. London: Coldwell, 1939. Pp. 191, with index. 5/6.

The subtitle of this work is " A Theological Portrait of Mary." With marvelous accuracy and with comparatively few strokes, the author gives us an authentic and endearing picture of Mary, the Bride Mother of Christ. There is nothing here of sentimentality or emotionalism, but a limpid theological explanation of the foundations of Mary's dignity and place in the economy of salvation.

The author shows that in the divine decree Mary was chosen to be the Mother, the Bride, and the triumphant Companion of the Incarnate Word in the work of Redemption. In these three offices is contained all that theology tells us of Mary. Ordinarily a mother does not share, except from afar, in the life work of her son. She accompanies him to the threshold of life, then relinquishes him to his wife, his helpmeet. Mary, however, was privileged to remain with Christ, His Helpmeet, His Bride, the new Eve, who with the new Adam, crushed the head of the ancient serpent. It was God's will that she should triumph completely over the devil, even as her Son. And so Mary was never subjected to the devil nor to the effects of sin—hence her immaculate conception, complete virginity even in Motherhood, her perfect sanctity, the assumption of her body before it could return to the dust of the earth. She, with her Son, and in her own way, merited salvation and grace for us. Now, as always, she distributes that grace from her throne above.

In his preface the author acknowledges a debt of gratitude to M. J. Scheeben, in whose writings he has found inspiration. We may be grateful to the author for acquainting us with the work of such a great theologian.

Jesuit Thinkers of the Renaissance. Ed. by GERARD SMITH, S. J. Milwaukee: Marquette University Press, 1939. Pp. xvii + 254. $3.00.

This book is a worthy tribute to a great professor, the Reverend John F. McCormack, S. J. by a group of his former students. The essays are concerned with important figures in the Jesuit Order at a critical period in the development of our civilization. The subjects are varied: " Suarez and the Organization of Learning," " Father Dominic Bonhours and Neo-Classical Criticism," " Molina and Human Liberty," " Leonard Lessius," " Juan de Mariana," and " Bellarmine and the Dignity of Man."

The book has value even apart from the essays. It includes a biography of Fr. McCormack and a list of his writings. There are also valuable bibliographical notices on Suarez, Molina and Bellarmine.

Jürgensmeier, Friedrich. *The Mystical Body of Christ.* (Translated from the German by H. Gardiner Curtis). London: Coldwell, 1939. Pp. 309, with index. 12/.

In his preface the author remarks: " The religious life of our times seeks essentials and tends towards a deeper and more intense spirituality." This is an important insight. Piety without a real appreciation of its own true foundations can become sentimentalism or sensationalism. Any work that tries to present the solid foundation of Christian spirituality deserves our attention.

The present work is based on the truth that in the present plan of salvation decreed by God, spiritual life is a growth in Christ. As Adam is our head by nature, Christ is our Head by grace. All grace, which is the fundamental principle of the spiritual life, comes from Christ, bearing in it the impress of his life and work. The closer our contact with Christ, and the more perfect our incorporation into His Body, the greater our spiritual life becomes.

The book is divided into two parts. The first part gives a biblico-dogmatic presentation of the doctrine of the mystical body of Christ. Special attention is given to the teachings of St. Paul. The dogmatic explanation centers around the capital grace of Christ. The second part treats of the various phases of the ascetical life based on the truth of the mystical body. Here the author offers countless suggestions for the development of real Christian piety.

Mersch, Emile, S. J. *Morality and the Mystical Body.* (Translated from the French by Daniel F. Ryan, S. J.). New York: Kenedy, 1939. Pp. 292, with bibliography. $3.50.

In a sense it is unfair to consider this work by itself. We must remember that the author has already published a large work on the doctrine of the mystical body. In the present work he has collected a series of articles that have appeared in different reviews. The unity of the work is the unity of its subject matter; there is however, great diversity in the treatment of it. There are three parts. In the first, the author discusses religion, Christianity and Catholicism, showing how closely they are related to God and Christ. The second part explains certain general principles regarding the doctrine of the mystical body. In the last part he makes some penetrating applications of the principles to illustrate the Catholic attitude on poverty, chastity, marriage, and obedience.

The reader will be delighted by the clarity of the exposition and the profound common sense of this book. As an example we shall take one of the best passages in which the author is discussing the social aspect of the mystical body. He says: "The Protestants look upon ecclesiastical unity as the result of common aspirations spread abroad among Christians, and as the social aspect of the supernatural. Ecclesiastical authority, in its turn, is for them only a simple function of the collectivity. . . . Yes, says the Church, if the Incarnation had not occurred. But, in the supernatural order it is Christ alone who causes life and movement to flow into His own. Unity and authority are then the principle of the multitude of members, and are far from being an emanation of it."

The following books were received:

Curtiss, Dr. & Mrs. F. Homer. *The Philosophy of War* (3rd Ed.) Washington, D. C.: Curtiss Philosophical Book Co. Pp. ix + 168, with index. $1.50.

Deman, Th., O. P. *Construction de la Paix.* (Collection: Chrétienté, 3) Paris: Les Editions du Cerf, 1939. Pp. vi + 77.

Eddington, Arthur. *The Philosophy of Physical Science.* New York: Macmillan, 1939. Pp. ix + 230, with index. $2.50.

Hoban, James. *The Thomistic Concept of Person and Some of its Social Implications.* Washington, D. C.: Catholic University of America, 1939. Pp. viii + 97, with index.

Knapke, Paul J. *Frederick Barbarossa's Conflict with the Papacy.* Washington, D. C.: Catholic University of America, 1939. Pp. xv + 126, with index.

Micklem, Dr. N. *National Socialism and the Roman Catholic Church.* New York: Oxford University Press, 1939. Pp. xvi + 243, with index. $3.00.

Palmer, Robert R. *Catholics and Unbelievers in Eighteenth Century France.* Princeton: Princeton University Press, 1939. Pp. 236, with index. $4.00.

Schuyler, Henry C. *Life's Final Goal.* Philadelphia: Peter Reilly Co., 1939. Pp. x + 365. $3.00.

Urban, Wilbur M. *Language and Reality.* (Library of Philosophy) New York: Macmillan, 1939. Pp. 755, with indices. $5.50.